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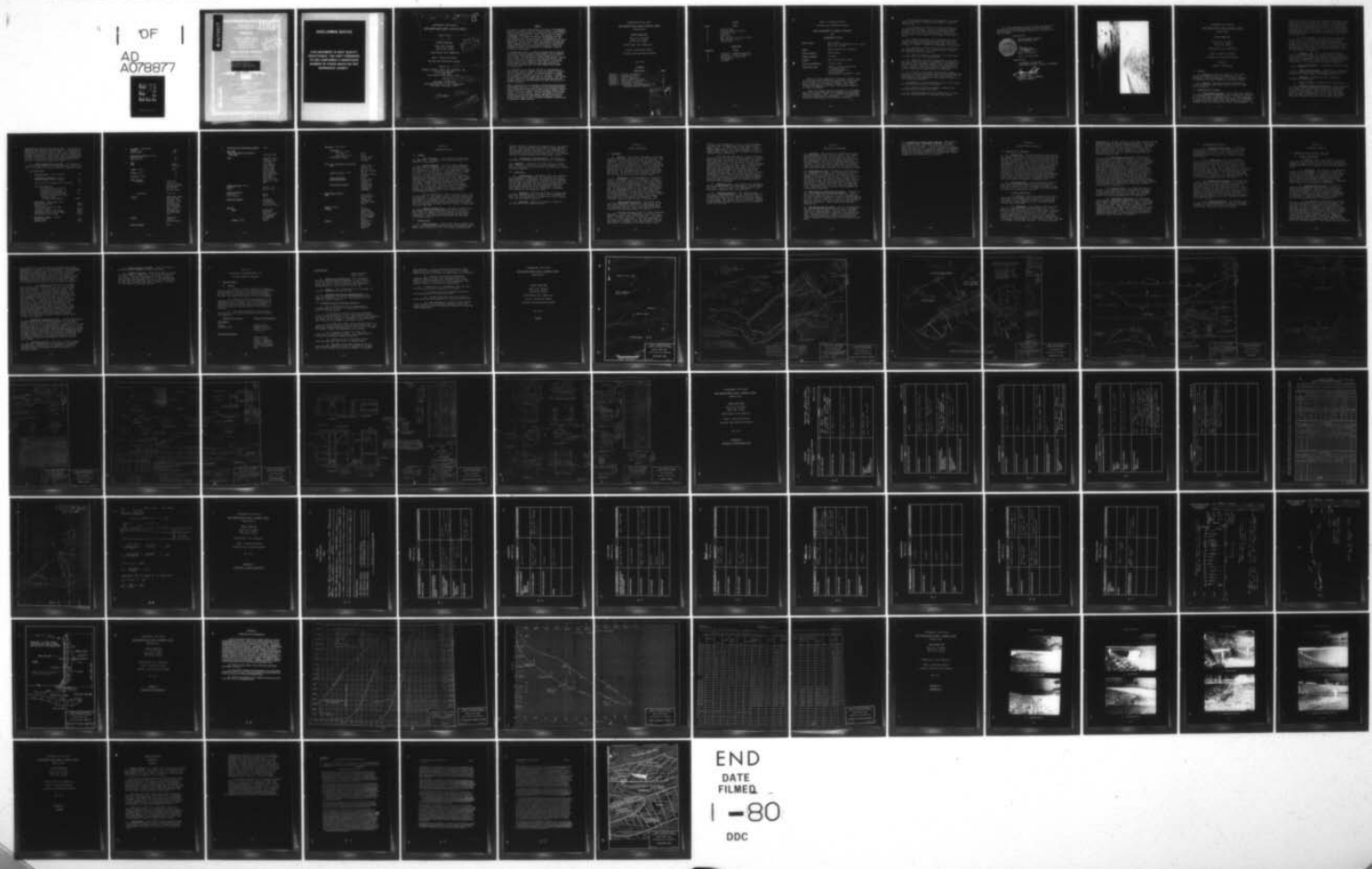

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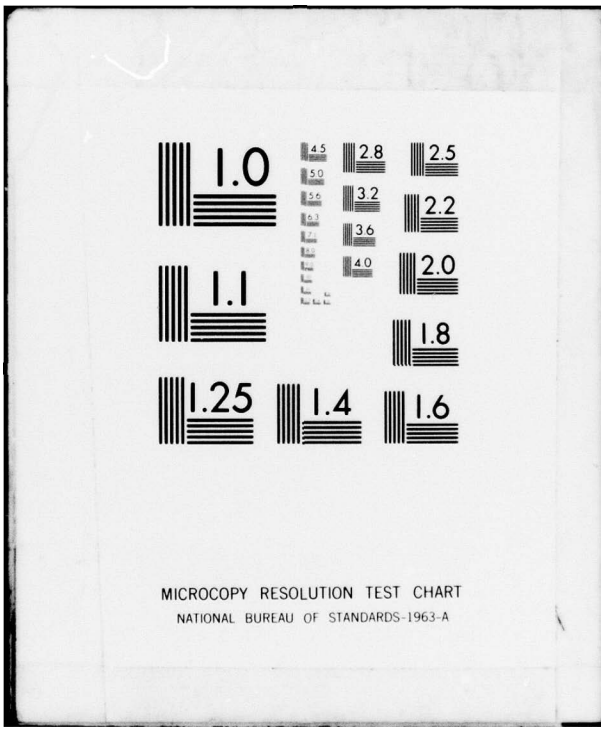
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(6) National Dam Inspection Program. Briar Creek Dam (NDI I.D. PA-00651, DER I.D. 19-77, SCS I.D. PA-497), Number (1)

SUSQUEHANNA RIVER BASIN,

EAST BRANCH BRIAR CREEK, COLUMBIA COUNTY,

PENNSYLVANIA. Phase I Inspection Report,

BRIAR CREEK DAM

NDI ID No. PA-00651
DER ID No. 19-77
SCS ID No. PA-497

PENNSYLVANIA FISH COMMISSION

PHASE I INSPECTION REPORT

NATIONAL DAM INSPECTION PROGRAM

Prepared by (15) DACW31-79-C-0015

GANNETT FLEMING CORDDRY AND CARPENTER, INC.
Consulting Engineers
P.O. Box 1963
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For (10) Albert Charles Hooke

DEPARTMENT OF THE ARMY
Baltimore District, Corps of Engineers
Baltimore, Maryland 21203

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(11) May 1979

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PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams, for Phase I Investigations. Copies of these guidelines may be obtained from the Office of Chief of Engineers, Washington, D.C. 20314. The purpose of a Phase I investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigation, and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I investigation; however, the investigation is intended to identify any need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. In cases where the reservoir was lowered or drained prior to inspection, such action, while improving the stability and safety of the dam, removes the normal load on the structure and may obscure certain conditions which might otherwise be detectable if inspected under the normal operating environment of the structure.

It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through frequent inspections can unsafe conditions be detected and only through continued care and maintenance can these conditions be prevented or corrected.

Phase I inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Guidelines, the spillway design flood is based on the estimated "Probable Maximum Flood" for the region (greatest reasonably possible storm runoff), or fractions thereof. The spillway design flood provides a measure of relative spillway capacity and serves as an aid in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition and the downstream damage potential.

SUSQUEHANNA RIVER BASIN

EAST BRANCH BRIAR CREEK, COLUMBIA COUNTY

PENNSYLVANIA

BRIAR CREEK DAM

NDI ID No. PA-00651
DER ID No. 19-77
SCS ID No. PA-497

PENNSYLVANIA FISH COMMISSION

PHASE I INSPECTION REPORT

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MAY 1979

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BRIEF ASSESSMENT OF GENERAL CONDITION

AND

RECOMMENDED ACTION

Name of Dam:	Briar Creek NDI ID No. PA-00651/DER ID No. 19-77/ SCS ID No. PA-497
Owner:	Pennsylvania Fish Commission
State Located:	Pennsylvania
County Located:	Columbia
Stream:	East Branch Briar Creek
Date of Inspection:	10 April 1979
Inspection Team:	Gannett Fleming Corddry and Carpenter, Inc. Consulting Engineers P.O. Box 1963 Harrisburg, Pennsylvania 17105

Based on visual inspection, available records, calculations and past operational performance, Briar Creek Dam is judged to be in good condition. The existing spillway can pass the Probable Maximum Flood (PMF) without overtopping of the dam. The spillway capacity is rated as adequate.

There is a slope stability analysis for the embankment, which indicates that the embankment has adequate factors of safety. There is no evidence of significant problems threatening the embankment. A slide and sinkholes have developed in the auxiliary spillway.

The following measures are recommended to be undertaken by the Owner, in approximate order of priority, without delay:

(1) Continue to monitor the filled sinkholes in the auxiliary spillway. Should the sinkholes develop further or should others develop, assess their size, location, and reason for development to determine if the assumption that they are not a hazard to the dam is valid.

(2) Extend the riprap on the upstream slope to a reasonable height above the main spillway riser crest. Inspect the upstream embankment after each flood for evidence of erosion. Repair the embankment as necessary.

(3) Continue to monitor the right bank slope near the auxiliary spillway. Any changes should be cause for immediate remedial measures.

(4) Perform surveys to ascertain if the auxiliary spillway crest is at its design grade.

(5) Implement the planned inspection of the main spillway conduit and riser to determine if elongation of the conduit and cavitation damage to the riser have occurred. If pool conditions prevent the implementation of the inspection, the pool should be drawn down as required to provide the opportunity for inspection.

(6) As part of the regular maintenance program, remove the tree near the impact basin, replace the missing riprap at the impact basin, provide better control of foot traffic on the embankment, and continue efforts to remove burrowing animals.

In addition, it is recommended that the Owner modify his operational procedures as follows:

(1) Develop a detailed emergency operation and warning system for Briar Creek Dam.

(2) Provide round-the-clock surveillance of Briar Creek Dam during periods of unusually heavy rains.

(3) When warnings of a storm of major proportions are given by the National Weather Service, the Owner should activate his emergency operation and warning system procedures.

Submitted by:

GANNETT FLEMING CORDDRY
AND CARPENTER, INC.

COMMONWEALTH OF PENNSYLVANIA
REGISTERED PROFESSIONAL
ALBERT CHARLES HOOKE
ENGINEER
No. 2201-E

A. C. HOOKE
Head, Dam Section

Date: 22 June 1979

Approved by:

DEPARTMENT OF THE ARMY
BALTIMORE DISTRICT, CORPS OF ENGINEERS

JAMES W. PECK
Colonel, Corps of Engineers
District Engineer

BRIAR CREEK DAM

Overview

SUSQUEHANNA RIVER BASIN

EAST BRANCH BRIAR CREEK, COLUMBIA COUNTY

PENNSYLVANIA

BRIAR CREEK DAM

NDI ID No. PA-00651
DER ID No. 19-77
SCS ID No. PA-497

PENNSYLVANIA FISH COMMISSION

PHASE I INSPECTION REPORT

NATIONAL DAM INSPECTION PROGRAM

SECTION 1

PROJECT INFORMATION

1.1 General.

a. Authority. The Dam Inspection Act, Public Law 92-367, authorized the Secretary of the Army, through the Corps of Engineers, to initiate a program of inspection of dams throughout the United States.

b. Purpose. The purpose of the inspection is to determine if the dam constitutes a hazard to human life or property.

1.2 Description of Project.

a. Dam and Appurtenances. Briar Creek Dam consists of a zoned, earthfill embankment that extends for 1,650 feet. It is 39 feet high at maximum section. The main spillway is a drop spillway located near the center of the embankment. It consists of a concrete riser that extends to a 42-inch diameter reinforced concrete pipe under the embankment. Two

2-foot by 2.5-foot orifices are located in the sides of the riser. The orifice inverts are 19.4 feet below the design elevation of the top of the dam. The top of the riser is 13.3 feet below the design top elevation. A platform and trash rack are provided above the riser. The outlet works is located at the main spillway. It consists of a 24-inch diameter steel pipe. A 24-inch sluice gate is provided at the downstream end of the pipe, which outlets into the bottom of the riser.

The auxiliary spillway is at the right abutment of the dam. It is a grass-lined excavation in earth. At the control section, the auxiliary spillway has an earthen crest that is 280 feet long and 7.6 feet below the design top elevation of the dam and 5.7 feet above the top of the main spillway riser. The various features of the dam are shown on the Plates at the end of the report and on the Photographs in Appendix D.

b. Location. The dam is located on East Branch Briar Creek approximately 1.7 miles northwest of Berwick, Pennsylvania. Briar Creek Dam is shown on the 1969 photorevision to USGS Quadrangle, Mifflinville, Pennsylvania, with coordinates N41°03'35" - W76°16'50", in Columbia County, Pennsylvania. The location map is shown on Plate 1.

c. Size Classification. Intermediate (39 feet high, 1,880 acre-feet).

d. Hazard Classification. High hazard. Downstream conditions indicate that a high hazard classification is warranted for Briar Creek Dam (Paragraph 5.1c.).

e. Ownership. Pennsylvania Fish Commission, Harrisburg, Pennsylvania.

f. Purpose of Dam. Recreation and flood control.

g. Design and Construction History. Briar Creek Dam was planned under an agreement between the Pennsylvania Fish Commission (Owner), the Soil Conservation Service of the U.S. Department of Agriculture (SCS), and the Columbia County Commissioners (CCC). Under this agreement, the Owner acquired title to the land, the SCS designed and funded construction of the dam, and the CCC

maintains the dam and surrounding park. The dam was designed between 1964 and 1965 by the SCS. The permit to construct the dam was issued in 1966. The construction was started in October, 1967 by the Giffin Construction Company, LeRaysville, Pennsylvania under the supervision of Earl B. Hess and D. Jean Learn, contracting officers for the CCC, and Harold Hurt, resident inspector for the SCS. The dam was completed in 1968.

h. Normal Operational Procedure. The reservoir is normally maintained at the main spillway orifice crest level. The gate on the outlet works is normally closed.

1.3 Pertinent Data.

a.	Drainage Area. (square miles)	5.11
b.	Discharge at Damsite. (cfs.)	
	Maximum known flood at damsite	260
	Outlet works at Normal pool elevation	75
	Spillway capacity.	
	Orifices with pool at main spillway riser crest	118
	Main Spillway with pool at auxiliary spillway crest	256
	Auxiliary spillway with pool at top of dam (design computations)	16,500
c.	Elevation. (feet above msl.)	
	Top of dam (design)	618.6
	Maximum pool	618.6
	Normal pool (main spillway orifice crest)	599.2
	Upstream Invert Outlet Works	582.0
	Downstream Invert Outlet Works	579.5
	Streambed at toe of dam	579.5
d.	Reservoir Length. (miles)	
	Normal pool	0.53
	Maximum pool	0.87

e.	Storage. (acre-feet)	
	Normal pool	360
	Maximum pool	1,880
f.	Reservoir Surface (acres)	
	Normal pool	51
	Maximum pool	107
g.	Dam.	
	Type	Zoned Earthfill
	Length (feet)	1,650
	Height (feet)	39
	Topwidth (feet)	15
	Side Slopes	
	Upstream	1V on 3H. There is a 12-foot sloping berm between EL. 597.2 and El. 596.2
	Downstream	1V on 2H
	Zoning	Impervious core and upstream blanket. Semi-pervious fill upstream and at downstream toe. Rockfill above semi-pervious fill at downstream toe.
	Cutoff	Impervious fill in cutoff trench.
	Grout Curtain	None

h.	Diversion and Regulating Tunnel	None
i.	Spillway.	
	Main (Principal or Service) Spillway	Drop Spillway
	Type	Vertical rectangular riser 3.5 feet by 10.5 feet, with rounded crest, Two 2-foot high by 2.5-foot long orifices are located in the sides of the riser. The riser connects to a conduit.
	Length of Weir (feet)	
	Orifices	Two at 2.5
	Riser	Two at 10.5
	Crest Elevation	
	Orifices	599.2
	Top of Riser	605.3
	Upstream Channel	Reservoir, a platform is 1.75 feet above the riser.
	Conduit	
	Type	Reinforced concrete pipe, 3.5 feet in diameter, on concrete cradle.
	Length (feet)	143.3

i. Spillway. (continued)

Elevation	
Upstream invert at riser	580.3
Downstream invert	579.5
Downstream Channel	Impact basin at natural stream.
Auxiliary (Emergency) Spillway	
Type	Grass-lined earthen cut with 1V on 3H side slopes.
Length of Weir (feet)	280 at earthen control section
Crest Elevation	611.0
Upstream Channel	Grass-lined channel to reservoir.
Downstream Channel	Grass-lined channel extending to overbank.

j. Regulating Outlets.

Type	Steel pipe, 24-inch diameter, extending to main spillway riser.
Length (feet).	30
Closure	24-inch, unseating head, sluice gate in riser at downstream end of steel pipe.
Access	Operator on platform above main spillway riser.

SECTION 2

ENGINEERING DATA

2.1 Design.

a. Data Available. Almost complete design data are available. A summary of the available data is in Appendix A and Appendix C.

b. Design Features. The dam and appurtenances are described in Paragraph 1.2a. The design features are shown on the Plates at the end of the report and on the Photographs in Appendix D. The embankment is shown on Plates 2, 3, and 4, and on Photographs A, B, C, and D. A plan of the subdrainage system is shown on Plate 5. Although not shown on the Plates, the available as-built information reveals that the cutoff trench centerline is located along the axis of the dam between stations 29+20 and 26+51 and between stations 17+39 and 13+00. Between stations 26+51 and 17+39, the centerline of the cutoff trench is 20 feet upstream of the axis of the dam. The trench has 1V on 2H sideslopes. It extends a maximum of 20 feet below the natural ground surface, and it has a bottom width as indicated on Plate 2.

The main spillway is shown on Plates 6 and 7 and on Photograph C. The impact basin is shown on Plate 8 and Photograph E. The auxiliary spillway is shown on Plates 2 and 3 and on Photographs G and H. Because the area just upstream from the auxiliary spillway was used as a borrow area, the auxiliary spillway approach channel is wider than the plans indicate.

c. Design Considerations. Although the main spillway design has been used successfully by the SCS for many years, it appears that the entrance to the conduit could possibly develop cavitation during certain flow conditions. Other design considerations are discussed in Sections 5 and 6.

2.2 Construction.

a. Data Available. Construction data available consist of the construction specifications, construction photographs, and reports both from the resident inspector and

from the periodic construction inspections by the Commonwealth. The only adverse item noted in these reports was the large number of boulders in the embankment fill. An inspector from the Commonwealth noted that the contractor was removing only the larger rocks. He requested that the contractor also remove the smaller rocks.

b. Construction Considerations. The available information indicates that the dam is well constructed.

2.3 Operation. There are no formal records of operation. Based on information from the caretaker of the dam, all structures have performed satisfactorily, except as noted hereafter.

2.4 Evaluation.

a. Availability. Engineering data were provided by the Bureau of Dam Safety, Obstructions, and Storm Water Management, Department of Environmental Resources, Commonwealth of Pennsylvania (PennDER), and by the SCS. The SCS made available the District Conservationist and the CCC made available the maintenance personnel for information during the visual inspection. The SCS also researched the files for additional information upon request of the inspection team.

b. Adequacy. The type and amount of design data and other engineering data is good. The assessment is based on the combination of design data, visual inspection, and performance history.

c. Validity. There is no reason to question the validity of the available data.

SECTION 3

VISUAL INSPECTION

3.1 Findings

a. General. The overall appearance of the dam is good, with a few deficiencies as noted herein. The locations of deficiencies are shown in Appendix B on Plate B-1. Survey data acquired during this inspection is presented in Appendix B. Datum for the survey was assumed at the design elevation of the platform on top of the riser pipe, El. 607.72. As the riser is founded on soil, settlement may have occurred, which would result in surveyed elevations being higher than the actual. On the day of the inspection, the pool was 1.0 foot above the spillway orifice crest.

b. Embankment. The embankment is in good condition. The grass cover is in excellent condition except for 4 areas, where foot and trail bike traffic has worn paths in the embankment. The riprap on the upstream slope is in good condition. It extends up to Elevation 603.6, about 15 feet below design top of dam. A survey performed for this inspection reveals that the embankment is at or above the design top elevation and that the slopes are in accordance with the design drawings. An area about 100 feet in length at the downstream toe to the right of the impact basin was wet on the day of the inspection. The caretaker reported that the area is usually dry.

c. Appurtenant Structures. The outlet works is in good condition, however its functioning on the day of the inspection could not be determined since it discharges into the riser, which was discharging from the flow passing through the orifices.

The main spillway riser is in good condition. The conduit beneath the embankment could not be inspected because it was flowing near full. The impact basin is in good condition. Very minor spalling, of no concern, was observed at a few localized areas of the concrete. Because of the high tailwater, it was impossible to determine if the drain pipes, which

extend to the embankment toe drain, were discharging. One small tree is immediately to the right of the impact basin. The dam tender stated that it would be removed immediately. The riprap downstream of the impact basin is uneven and does not appear to provide complete erosion protection.

The auxiliary spillway is in good condition, The grass cover is in good condition except at 3 areas, where sinkholes had previously developed. The sinkholes have been filled but the grass cover has not reestablished itself. An area of the spillway approach channel has slid along the right bank. This area is about 400 feet upstream of the control section. A worn foot trail extends down the right bank slope. Burrowing animals inhabit the banks and bottom of the auxiliary spillway. The survey performed for this inspection revealed that the control section invert is between 0.2 to 0.9 foot above the design elevation. Part of the difference between the actual and design elevation may be explained by the uncertain survey datum as noted previously.

d. Reservoir Area. The reservoir has generally gentle grassed slopes. The watershed is mostly wooded and steep. There is minor rural development in the watershed, especially near the reservoir.

e. Downstream Channel. The stream extends 4.8 miles, through Berwick, to its confluence with the Susquehanna River near the community of Briar Creek. In this reach there are at least 40 dwellings adjacent to the stream. The access road to the dam is a public road extending far above and parallel to the reservoir along the left bank.

SECTION 4

OPERATIONAL PROCEDURES

4.1 Procedure. The reservoir is maintained at main spillway orifice crest, Elevation 599.2, with excess inflow discharging over the spillway and into the East Branch Briar Creek, which eventually flows into the Susquehanna River about 4.8 miles downstream. A 24-inch diameter steel pipe discharges water from the reservoir. Since the outlet works pipe is intended only for drawing down the reservoir, the gate on the Briar Creek Dam water discharge line is usually closed.

4.2 Maintenance of Dam. The dam is visited daily by the caretakers who observe the condition of the dam. The caretakers are responsible for reporting any changes or deficiencies to the SCS. The CCC, with the assistance of the SCS, makes a formal inspection of the dam each year, and the records are filed. Maintenance deficiencies are corrected shortly after the inspection. Informal inspections are also made when the SCS representative is on the site for other reasons. Mowing and brush cutting on the embankment is accomplished frequently.

4.3 Maintenance of Operating Facilities. The gate on the outlet works pipe is operated annually. This policy was adopted by the SCS in 1978. The gate had not been operated previously, since the construction of the dam. Upon its operation in 1978, it was discovered that a set-screw on the gate valve was loose and the gate was inoperable. This condition was repaired immediately.

4.4 Warning Systems in Effect. The SCS Representative and the caretaker stated that there was no emergency operation or warning plan. They did note that the local civil defense office maintains a rain gauge and that, during heavy rains, contact is maintained with them. The dam tender also stated that the dam was visited frequently during Tropical Storm Agnes in June, 1972.

4.5 Evaluation of Operational Adequacy. Maintenance of the dam is good. Maintenance of the operating facilities is also good. The procedures used to inspect the dam are good, as is the correction of maintenance deficiencies. An emergency operation and warning system is a necessary safeguard to improve the safety of the dam and prevent loss of life downstream, should evidence of stress develop at the dam.

SECTION 5

HYDROLOGY AND HYDRAULICS

5.1 Evaluation of Features.

a. Design Data. The hydrology and hydraulics of the design of the dam was based on standard SCS criteria. The orifice elevation was determined by sediment and recreation requirements. The crest elevation and size of the drop spillway riser was designed to provide a 5 hour retardation of the 100-year, 6-hour storm. The crest of the auxiliary spillway was set at the maximum 100-year pool level. The design high water was determined by routing a storm equal to 1.25 times the above 100 year storm, which was modified by assuming saturated soil conditions. The top of dam elevation and auxiliary spillway size were determined by routing the "Freeboard" storm, which is equal to twice the design high water storm (2.5 times the modified 100-year, 6-hour storm). This last storm is discussed in Paragraph 5.1d.

b. Experience Data. The maximum known flood at the damsite occurred during Tropical Storm Agnes in June, 1972, when water just overtopped the crest of the auxiliary spillway. Using the design discharge ratings, the outflow is estimated at 260 cfs.

c. Visual Observations.

(1) General. The visual inspection of Briar Creek Dam, which is described in Section 3, resulted in a number of observations relevant to hydrology and hydraulics. These observations are evaluated herein for the various features.

(2) Embankment. The design elevation of the top of the riprap on the upstream slope is El. 603.2, about 2.1 feet below the top of the riser pipe. This is 7.8 feet below the design 100-year pool level. The reason for selecting this elevation is not noted in the design computations. Lack of riprap on the upper portion of the slope creates an erosion hazard during flood conditions. Terminating the riprap below the top of the dam is a standard SCS design criteria. In view of the good

maintenance at the dam, erosion on the upper parts of the embankment would be repaired immediately after it occurred. This would make the erosion hazard negligible. Apparently the SCS considered the main spillway orifices to be the main spillway crest, as the riprap is 4.0 feet above the orifice crests. A more conservative designer would have selected the crest of the main spillway riser as the main spillway crest.

(3) Appurtenant Structures. The gate for the outlet works is located sufficiently far upstream to be considered an upstream closure facility. The cause of the uneven riprap below the impact basin is unknown. The erosion hazard is minor. The slide in the auxiliary spillway approach channel is sufficiently far from the control section that it will not affect the hydraulics. Although the exact elevations of the control section are uncertain, it appears that at least part of it is above the design elevation. As the flood routing for the "Freeboard" storm was accomplished using 1V on 1H auxiliary spillway side slopes, and since the final design used 1V on 3H side slopes, the auxiliary spillway crest being slightly above the design elevation does not significantly reduce the design capacity. Other observations concerning the auxiliary spillway are discussed in Section 6.

(4) Reservoir Area. No conditions were observed in the reservoir area or watershed that might present significant hazard to the dam. The assessment of the dam is based on existing conditions, and the effects of future development are not considered.

(5) Downstream Conditions. No conditions were observed immediately downstream from the dam that would create significant hazard to the dam. If the dam should fail, a hazard to dwellings in Berwick and Briar Creek would exist. Because of the possibility of flooding dwellings, a high hazard classification is warranted for Briar Creek Dam. The SCS designed the dam assuming that it was a Class C structure. This is essentially equivalent to a high hazard classification. Access to Briar Creek Dam is excellent.

d. Overtopping Potential.

(1) Spillway Design Flood. According to the criteria established by the Office of the Chief of Engineers (OCE) for the size (Intermediate) and hazard potential (High) of Briar Creek Dam, the Spillway Design Flood (SDF) is the Probable Maximum Flood (PMF).

(2) Design Storm. The SCS "Freeboard" storm, which was used to determine the size of the auxiliary spillway and the top elevation of the dam, was not developed from PMF methods. However, the total rainfall of 24.3 inches is equivalent to a PMF rainfall for this area. The assumed losses of 3.4 inches are slightly higher than those established by criteria for the Susquehanna Basin. The unit hydrograph used by the SCS is conservative. The computed peak inflow of 17,680 cfs is equivalent to a PMF peak inflow. The storm is an acceptable estimate of the PMF.

(3) Design Storm Routing. The design storm routing computations are in Appendix C. It should be noted that the SCS assumed the main spillway to be functional up to the top elevation of the dam. As the main spillway is not vented and as there is a potential of debris blocking the trash rack, it is uncertain that the main spillway could discharge at this capacity. However, the main spillway capacity is minimal when compared to the auxiliary spillway capacity, and any reduction would have negligible effect on the PMF routing.

(4) Spillway Adequacy. The criteria used to rate the spillway adequacy of a dam are described in Appendix C. Since Briar Creek Dam can pass the PMF, the spillway capacity is rated as adequate.

SECTION 6

STRUCTURAL STABILITY

6.1 Evaluation of Structural Stability.

a. Visual Observations.

(1) General. The visual inspection of Briar Creek Dam, which is described in Section 3, resulted in a number of observations relevant to structural stability. These observations are evaluated herein for various features.

(2) Embankment. The trails on the embankment present an erosion hazard. The problem is minor at present and the caretaker is planning to provide steps to alleviate the problem. He stated that the use of trail bikes on the embankment has been prohibited. The wet area at the toe was probably caused by the heavy rain on the day before the inspection. Therefore, the wet area is not considered a deficiency.

(3) Appurtenant Structures. The SCS representative expressed a desire that the conduit beneath the embankment be inspected. He stated that it had not been inspected since the dam was completed. As noted in Section 3, the pipe could not be inspected. As the joints of concrete pipes founded on earth tend to separate, an inspection appears to be prudent. The tree at the impact basin is undesirable.

The sinkholes in the auxiliary spillway developed immediately after Tropical Storm Agnes. This was the only time flow occurred over the auxiliary spillway. As noted in Appendix E, the geology at the auxiliary spillway is complex. The logs of drill holes performed as part of the foundation exploration indicate that the embankment is not founded on either the fault or the solution-prone limestone. The caretaker is inspecting the sinkhole area frequently. Immediately after Tropical Storm Agnes, the SCS had engineers experienced with dams in limestone areas inspect the sinkholes and recommend repairs. Their report was not available

for review but the conclusions and recommendations were summarized in a letter to the Commonwealth. The recommendations were to backfill the sinkholes with a reverse filter. This has been accomplished. The conclusions were that sinkholes would continue to develop in the auxiliary spillway, that the sinkholes would not be a hazard to the embankment, and that repairing them as they developed is the only economical method of controlling them. There is no reason to doubt the validity of these conclusions.

The burrowing animals are not an immediate hazard to the dam because they have not burrowed into the embankment. The caretaker is concerned that they will, and he is trying to eliminate them. The foot trail provides a very minor erosion hazard. The slide in the spillway approach channel right bank is not an immediate hazard to the dam. The area was used for embankment borrow and is indicated as a spoil area on Plate 2. The material that slid may be spoil material. The cut near the control section is on the same slope. The soils analysis indicates that the natural overburden in the slide area and near the auxiliary spillway control section are similar. The slide occurred immediately after Tropical Storm Agnes, and high ground water conditions resulting from the storm were probably a major factor in causing the slide. Any indication of slope movement occurring closer to the auxiliary spillway control section would be cause for concern.

b. Design and Construction Data. A stability analysis was performed by the SCS during the design of the dam. A summary of the results is in Appendix A. The stability analysis resulted in a minimum factor of safety of 1.62 on the upstream slope for the sudden drawdown condition and 1.77 on the downstream slope for the steady seepage condition. These factors of safety are greater than the recommended minimum in the guidelines of the office of the Chief of Engineers (OCE). A seepage analysis was performed during the design and is included in Appendix A. The analysis does not include the effects of the upstream impervious blanket and the drain system.

c. Operating Records. There are no formal records of operation. According to the caretaker, no stability problems have occurred over the operational history of the dam, except in the spillway approach channel, as previously noted.

d. Postconstruction Changes. There have been no postconstruction changes to Briar Creek Dam.

e. Seismic Stability. Briar Creek Dam is located in Seismic Zone 1. Normally it can be considered that if a dam in this zone has adequate factors of safety under static loading conditions, it can be assumed safe for any expected earthquake loading. Since the factors of safety are adequate, the dam is assumed to be stable for any expected earthquake loading.

SECTION 7

ASSESSMENT, RECOMMENDATIONS, AND

PROPOSED REMEDIAL MEASURES

7.1 Dam Assessment.

a. Safety.

(1) Based on visual inspection, available records, calculations, and past operational performance, Briar Creek Dam is judged to be in good condition. The spillway can pass the PMF without overtopping of the dam. The spillway capacity is rated as adequate.

(2) There is a stability analysis for the embankment, which indicates that the embankment has adequate factors of safety. There is no evidence of significant problems threatening the embankment. A slide and sinkholes have developed in the auxiliary spillway.

(3) The visual inspection revealed some deficiencies, which are summarized below for the various features.

Feature and Location	Observed Deficiencies
Embankment :	
Slopes	Eroded trails
Upstream slope	Riprap does not extend to the top of the dam.
Auxiliary Spillway:	
	Uneven control section invert, slide in approach channel, sinkholes in bottom of spillway, burrowing animals.

Outlet Works:

Small tree near impact basin.

b. Adequacy of Information. The information available is such that an assessment of the condition of the dam can be inferred from the combination of visual inspection, past performance, and computations performed prior to and as part of this study.

c. Urgency. The recommendations in Paragraph 7.2 should be implemented without delay.

d. Necessity for Further Investigations. In order to accomplish some of the remedial measures outlined in Paragraph 7.2, further investigations by the Owner will not be required.

7.2 Recommendations and Remedial Measures.

a. The following measures are recommended to be undertaken by the Owner, in approximate order of priority, without delay:

(1) Continue to monitor the filled sinkholes in the auxiliary spillway. Should the sinkholes develop further or should others develop, assess their size, location, and reason for development to determine if the assumption that they are not a hazard to the dam is valid.

(2) Extend the riprap on the upstream slope to a reasonable height above the main spillway riser crest. Inspect the upstream embankment after each flood for evidence of erosion. Repair the embankment as necessary.

(3) Continue to monitor the right bank slope near the auxiliary spillway. Any changes should be cause for immediate remedial measures.

(4) Perform surveys to ascertain if the auxiliary spillway crest is at its design grade.

(5) Implement the planned inspection of the main spillway conduit and riser to determine if elongation of the conduit and cavitation damage to the riser

have occurred. If pool conditions prevent the implementation of the inspection, the pool should be drawn down as required to provide the opportunity for inspection.

(6) As part of the regular maintenance program, remove the tree near the impact basin, replace the missing riprap at the impact basin, provide better control of foot traffic on the embankment, and continue efforts to remove burrowing animals.

b. In addition, it is recommended that the Owner modify his operational procedures as follows:

(1) Develop a detailed emergency operation and warning system for Briar Creek Dam.

(2) Provide round-the-clock surveillance of Briar Creek Dam during periods of unusually heavy rains.

(3) When warnings of a storm of major proportions are given by the National Weather Service, the Owner should activate his emergency operation and warning system procedures.

SUSQUEHANNA RIVER BASIN

EAST BRANCH BRIAR CREEK, COLUMBIA COUNTY

PENNSYLVANIA

BRIAR CREEK DAM

NDI ID No. PA-00651
DER ID No. 19-77
SCS ID No. PA-497

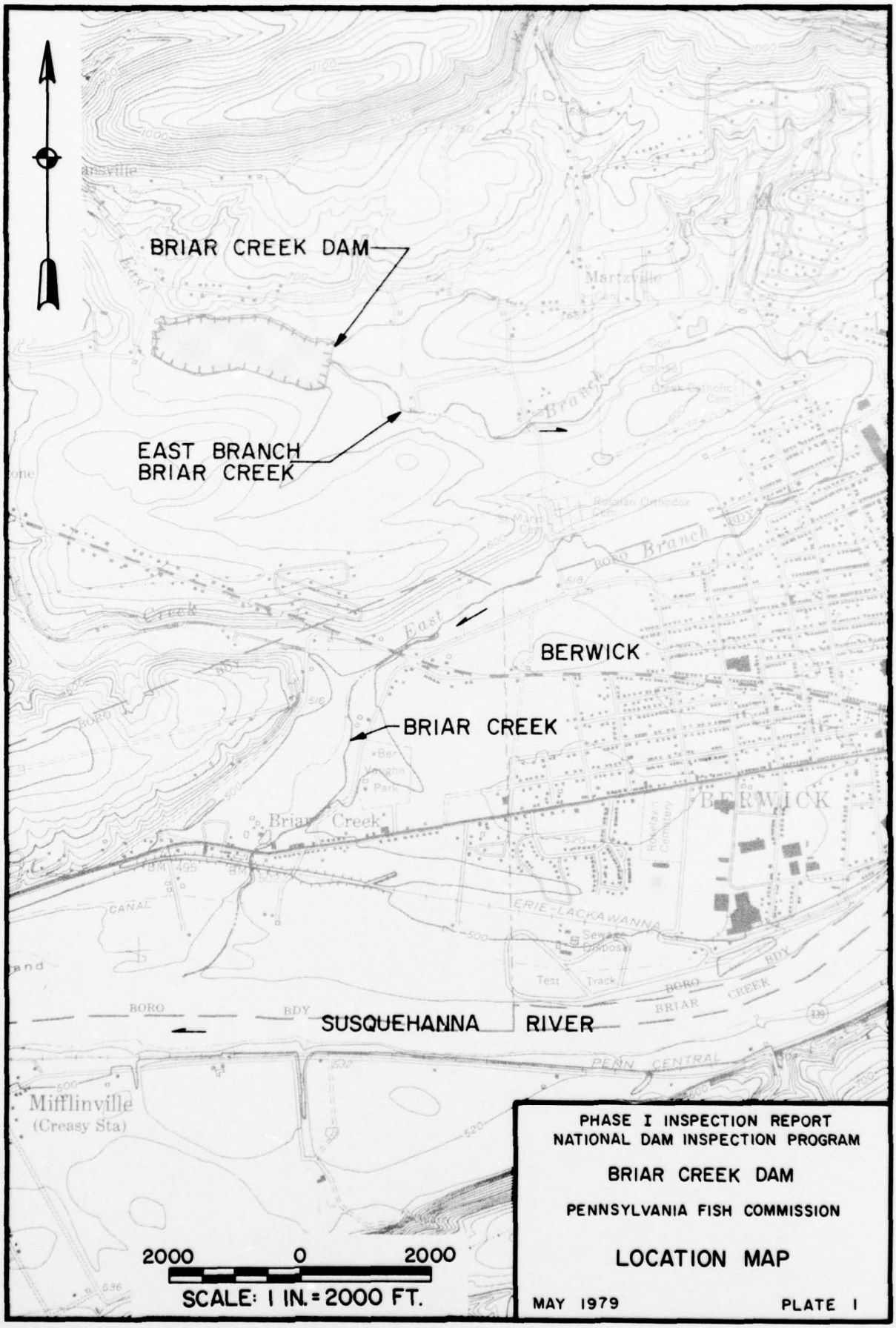
PENNSYLVANIA FISH COMMISSION

PHASE I INSPECTION REPORT

NATIONAL DAM INSPECTION PROGRAM

MAY 1979

PLATES



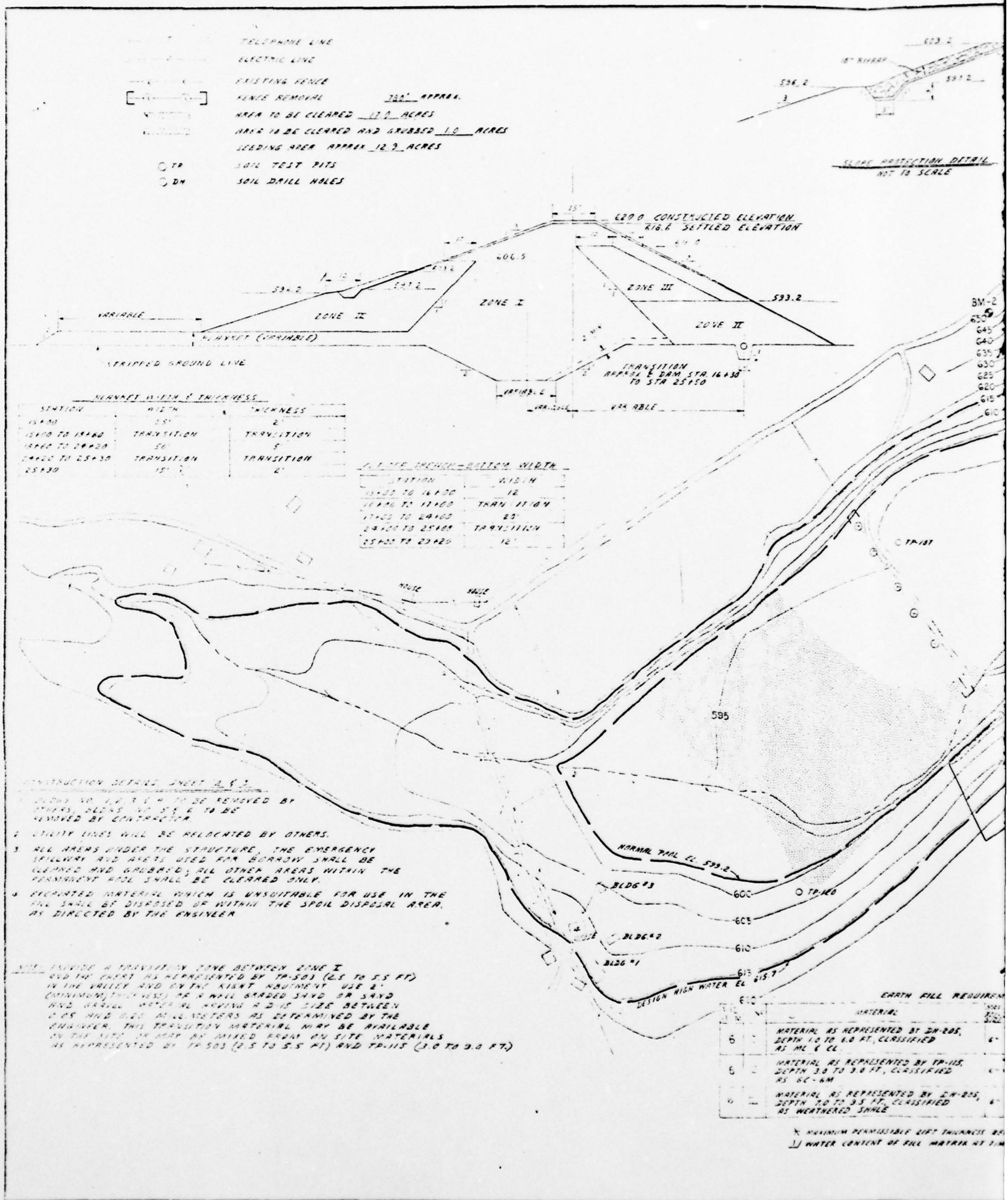
PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

BRIAR CREEK DAM

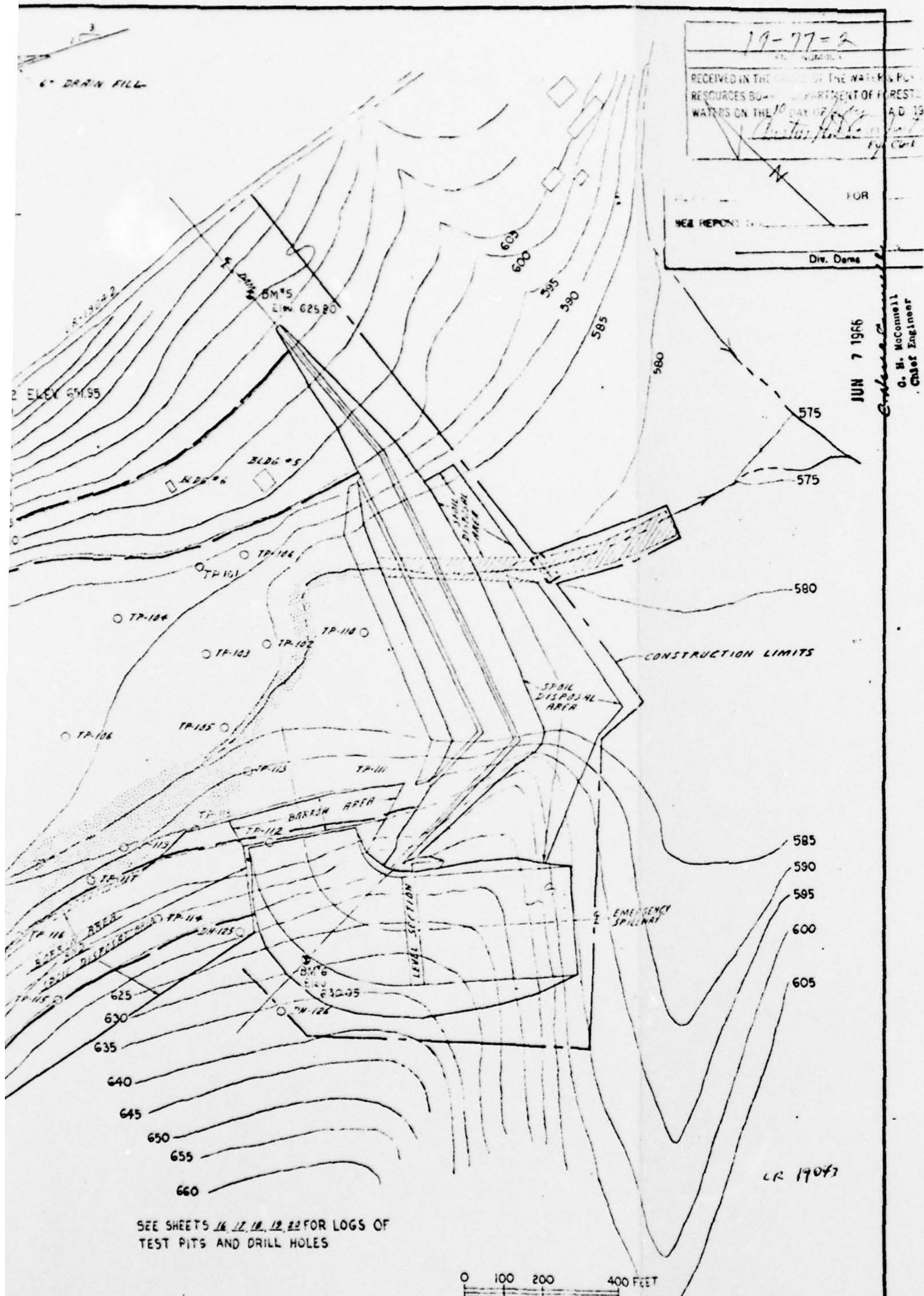
PENNSYLVANIA FISH COMMISSION

LOCATION MAP

MAY 1979 PLATE 1


TELEPHONE LINE
ELECTRIC LINE
EXISTING FENCE
FENCE REMOVAL 380' APPROX.
AREA TO BE CLEARED 12.0 ACRES
AREA TO BE CLEARED AND GRUBBED 1.0 ACRES
SEEDING AREA APPROX 12.9 ACRES
TP SOIL TEST PITS
DH SOIL DRILL HOLES
SLOPE PROTECTION DETAIL
NOT TO SCALE
18" RIPRAP
596.2
597.2
603.2
620.0 CONSTRUCTED ELEVATION
616.6 SETTLED ELEVATION
15'
606.5
594.2
593.2
ZONE I
ZONE II
ZONE III
VARIABLE
BLANKET (VARIABLE)
STRIPPED GROUND LINE
TRANSITION
APPROX. ℄ DAM STA. 16+30
TO STA 25+50
BLANKET WIDTH & THICKNESS
STATION | WIDTH | THICKNESS
15+00 | 25' | 2'
15+00 TO 19+60 | TRANSITION | TRANSITION
19+60 TO 24+20 | 50' | 5'
24+20 TO 25+30 | TRANSITION | TRANSITION
25+30 | 15' | 2'
CUTOFF TRENCH—BOTTOM WIDTH
STATION | WIDTH
15+00 TO 16+00 | 12
16+00 TO 17+00 | TRANSITION
17+00 TO 24+00 | 20'
24+00 TO 25+00 | TRANSITION
25+00 TO 29+25 | 12'
HOUSE
HOUSE
595
TP-187
TP-120
BM-2
NORMAL POOL EL. 599.2
DESIGN HIGH WATER EL 615.7
BLDG #3
BLDG #2
BLDG #1
600
605
610
615
620
CONSTRUCTION DETAILS SHEET 2 & 3
1. BLDGS NO. 1, 2, 3 & 4 TO BE REMOVED BY OTHERS, BLDGS NO. 5 & 6 TO BE REMOVED BY CONTRACTOR.
2. UTILITY LINES WILL BE RELOCATED BY OTHERS.
3. ALL AREAS UNDER THE STRUCTURE, THE EMERGENCY SPILLWAY AND AREAS USED FOR BORROW SHALL BE CLEARED AND GRUBBED; ALL OTHER AREAS WITHIN THE PERMANENT POOL SHALL BE CLEARED ONLY.
4. EXCAVATED MATERIAL WHICH IS UNSUITABLE FOR USE IN THE FILL SHALL BE DISPOSED OF WITHIN THE SPOIL DISPOSAL AREA AS DIRECTED BY THE ENGINEER.
NOTE: PROVIDE A TRANSITION ZONE BETWEEN ZONE I AND THE CHERT AS REPRESENTED BY TP-503 (2.5 TO 5.5 FT) IN THE VALLEY AND ON THE RIGHT ABUTMENT. USE 2' (MINIMUM) THICKNESS OF A WELL GRADED SAND OR SAND AND GRAVEL MATERIAL HAVING A D15 SIZE BETWEEN 0.05 AND 0.25 MILLIMETERS AS DETERMINED BY THE ENGINEER. THIS TRANSITION MATERIAL MAY BE AVAILABLE ON THE SITE OR MAY BE MIXED FROM ON SITE MATERIALS AS REPRESENTED BY TP-503 (2.5 TO 5.5 FT) AND TP-115 (3.0 TO 9.0 FT.)
EARTH FILL REQUIREM
MATERIAL
MATERIAL AS REPRESENTED BY DH-205, DEPTH 1.0 TO 6.0 FT., CLASSIFIED AS ML & CL.
MATERIAL AS REPRESENTED BY TP-115, DEPTH 3.0 TO 9.0 FT., CLASSIFIED AS GC-GM
MATERIAL AS REPRESENTED BY DH-205, DEPTH 7.0 TO 35 FT., CLASSIFIED AS WEATHERED SHALE
* MAXIMUM PERMISSIBLE LIFT THICKNESS
1/ WATER CONTENT OF FILL MATERIAL AT TIM

1



SEE SHEETS 16, 17, 18, 19, 20 FOR LOGS OF TEST PITS AND DRILL HOLES

0 100 200 400 FEET

...EMENTS ...-LIFT	WATER CONTENT	CLASS	COMPACTION DEFINITION
9"	OPTIMUM ± 2.5%	A	95% MAX. DENSITY BY ASTM D-698 METHOD "A"
9"	OPTIMUM ± 3.0%	A	95% MAX. DENSITY BY ASTM D-698 METHOD "C"
9"	OPTIMUM + 3.5 - 0.5	A	95% MAX. DENSITY BY ASTM D-698 METHOD "A"

...BEFORE COMPACTION
...TIME OF COMPACTION

BRIAR CREEK WATERSHED
MULTIPLE PURPOSE DAM PA-497
COLUMBIA COUNTY, PENNSYLVANIA
PLAN OF STORAGE AREA

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

		Date	
Designed	[illegible]	12-65	Approved by
	C. Crise	12-65	Title
Drawn	D. R. Schaffner	8-65	
Traced			Title
Checked	James [illegible]	1-65	Sheet No. 2 of 20 — Drawing No. PA-497-P

FORM SCS 313 (APRIL 1963)

2

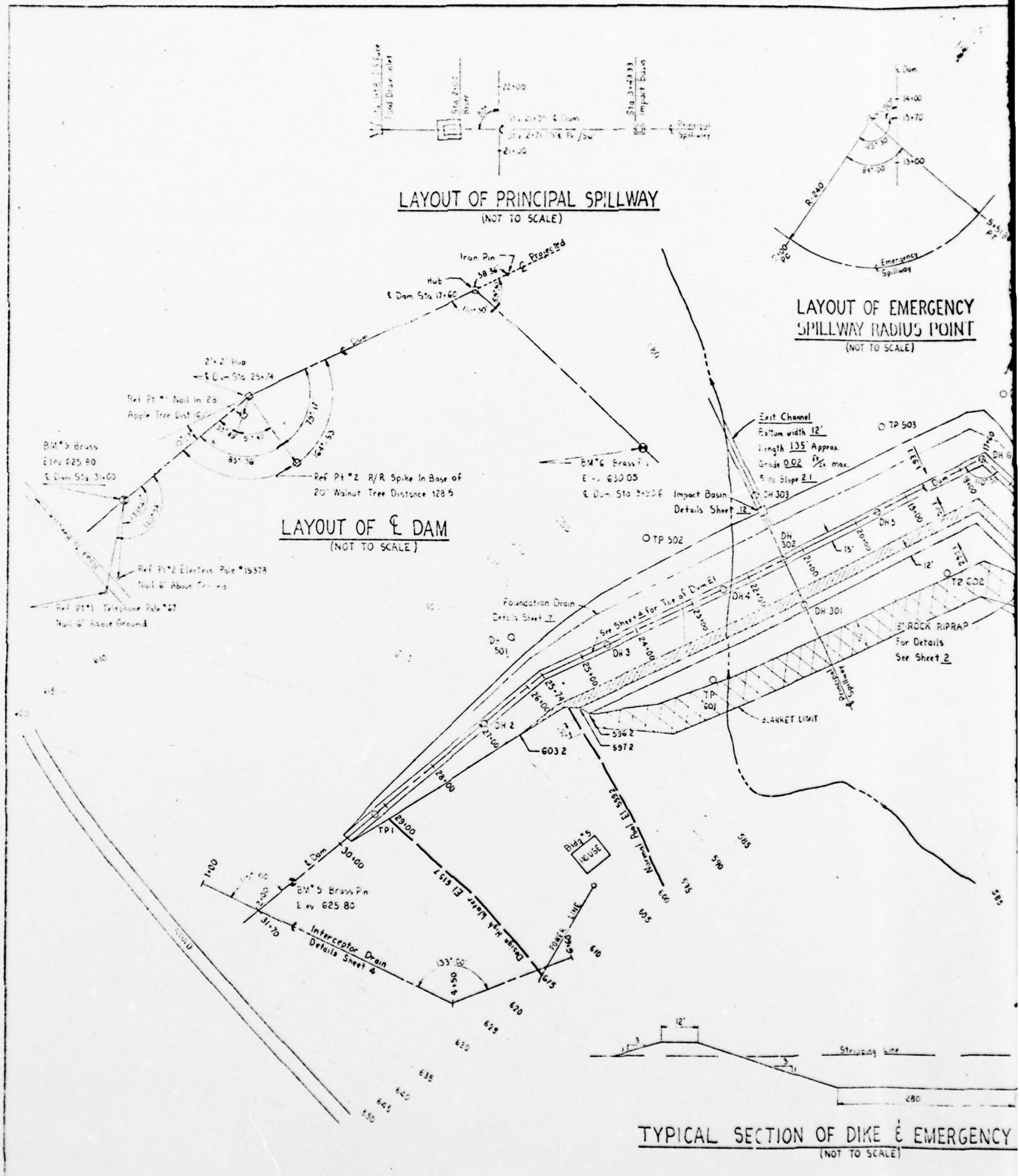
PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

BRIAR CREEK DAM

PENNSYLVANIA FISH COMMISSION

PLAN AND TYPICAL SECTION

MAY 1979 PLATE 2

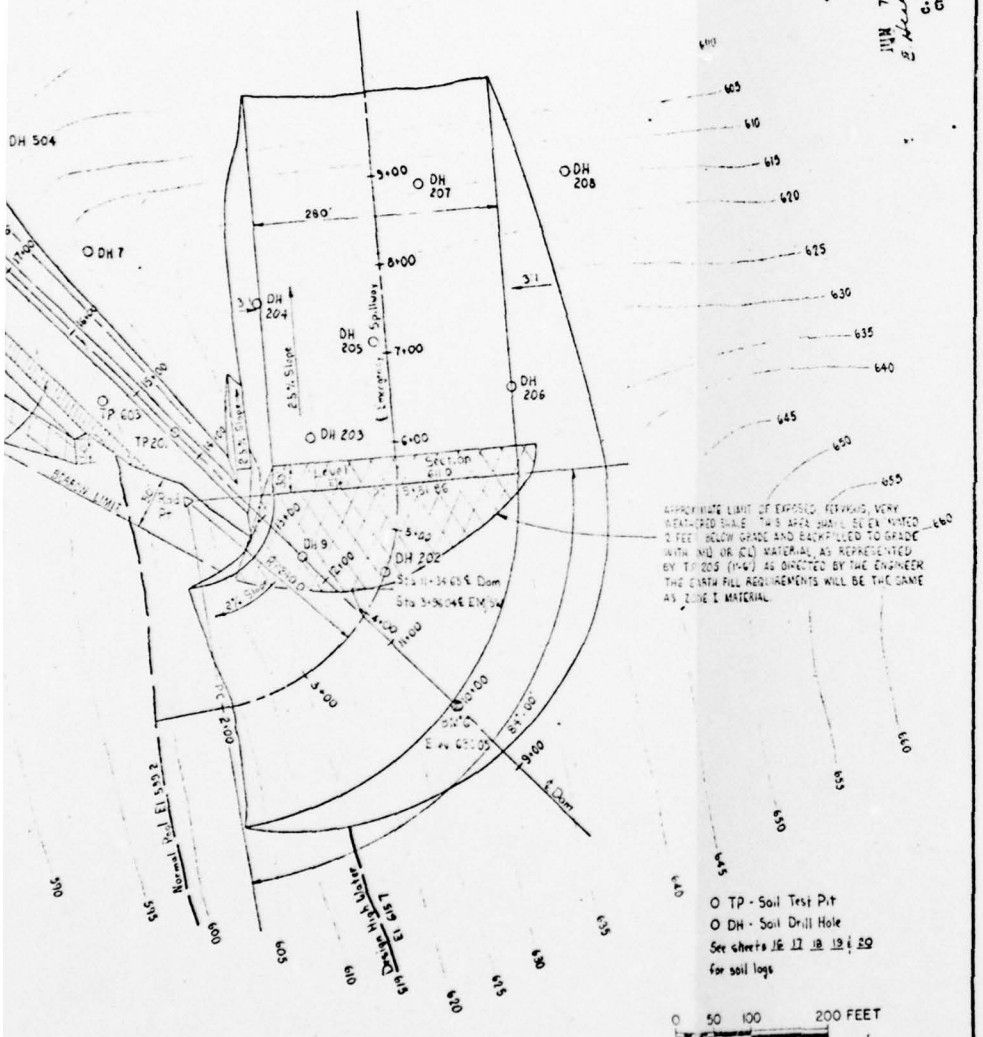


LAYOUT OF PRINCIPAL SPILLWAY
(NOT TO SCALE)
Impact Basin
Principal Spillway
22+00
21+00
LAYOUT OF EMERGENCY SPILLWAY RADIUS POINT
(NOT TO SCALE)
℄ Dam
14+00
13+70
13+00
125°30'
84°00'
R=240'
Emergency Spillway
LAYOUT OF ℄ DAM
(NOT TO SCALE)
Iron Pin
Projected
Hub
℄ Dam Sta 17+60
58°36'
2"x2" Hub
℄ Dam Sta 25+74
Ref Pt #1 Nail In 28" Apple Tree Dist 16.1'
BM #5 Brass
Elev 625.80
℄ Dam Sta 31+60
85°36'
79°17'
64°53'
Ref Pt #2 R/R Spike In Base of 20" Walnut Tree Distance 128.5
BM #6 Brass Pin
Elev 630.05
Ref Pt #2 Electric Pole #15378
Nail 6' Above Ground
Ref Pt #1 Telephone Pole #67
Nail 6' Above Ground
Exit Channel
Bottom width 12'
Length 135' Approx.
Grade 0.02 ft/ft max.
Side Slope 2:1
Impact Basin
Details Sheet 12
DH 303
TP 503
TP 502
DH 302
DH 5
DH 4
DH 301
DH 3
DH 2
TP 602
TP 601
TP 1
Foundation Drain
Details Sheet 7
See Sheet 4 for Top of Dam El
3" ROCK RIPRAP
For Details
See Sheet 2
BLANKET LIMIT
603.2
597.2
596.2
Normal Pool El 599.2
Design High Water El 615.7
Bldg #5
HOUSE
POWER LINE
BM #5 Brass Pin
Elev 625.80
Interceptor Drain
Details Sheet 4
133°00'
ROAD
TYPICAL SECTION OF DIKE & EMERGENCY
(NOT TO SCALE)
12'
Stripping Line
280

EMERGENCY SPILLWAY ℄ CURVE DATA

STATION	DEFL. ∠	CHORD
PC 2+00.00	0°00'	
2+33.51	4°00'	33.48
2+67.02	8°00'	33.48
3+00.53	12°00'	33.48
3+34.04	16°00'	33.48
3+67.55	20°00'	33.48
4+01.06	24°00'	33.48
4+34.57	28°00'	33.48
4+68.08	32°00'	33.48
5+01.59	36°00'	33.48
5+35.10	40°00'	33.48
PT 5+51.86	42°00'	16.75

I = 84° 00'
R = 240.00'
T = 216.10'
Lc = 351.86'
C = 321.18
M = 61.65
E = 82.95
PC = STA. 2+00.00
PT = STA 5+51.86



APPROXIMATE LIMIT OF EXPOSED FERRUGINOUS, VERY WEATHERED SHALE. THIS AREA SHALL BE EXCAVATED 2 FEET BELOW GRADE AND BACKFILLED TO GRADE WITH (ML) OR (CL) MATERIAL AS REPRESENTED BY TP 205 (1-6) AS DIRECTED BY THE ENGINEER. THE EARTH FILL REQUIREMENTS WILL BE THE SAME AS ZONE I MATERIAL.

O TP - Soil Test Pit
O DH - Soil Drill Hole
See sheets 16 17 18 19 & 20 for soil logs

0 50 100 200 FEET
SCALE

BRIAR CREEK WATERSHED
MULTIPLE PURPOSE DAM PA-497
COLUMBIA COUNTY, PENNSYLVANIA
PLAN OF DAMSITE

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Designed L Herman 12-65
Drawn D.R. Schaffner 11-65
Traced
Checked James Robinson 12-65
Approved by
Title
Date
Sheet No. 3 of 20
Drawing No. PA-497-P

SCS-313C (9-64)

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

BRIAR CREEK DAM

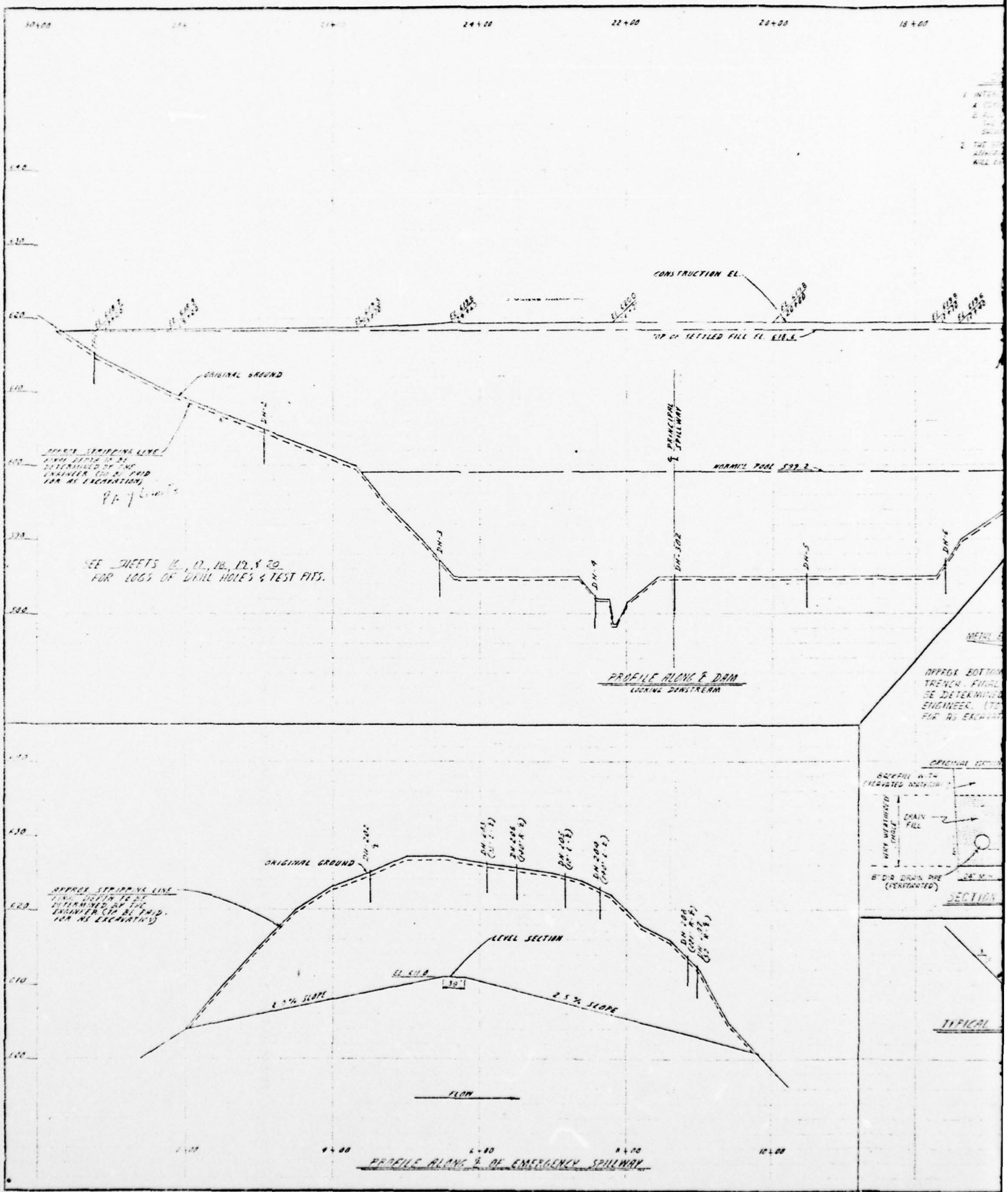
PENNSYLVANIA FISH COMMISSION

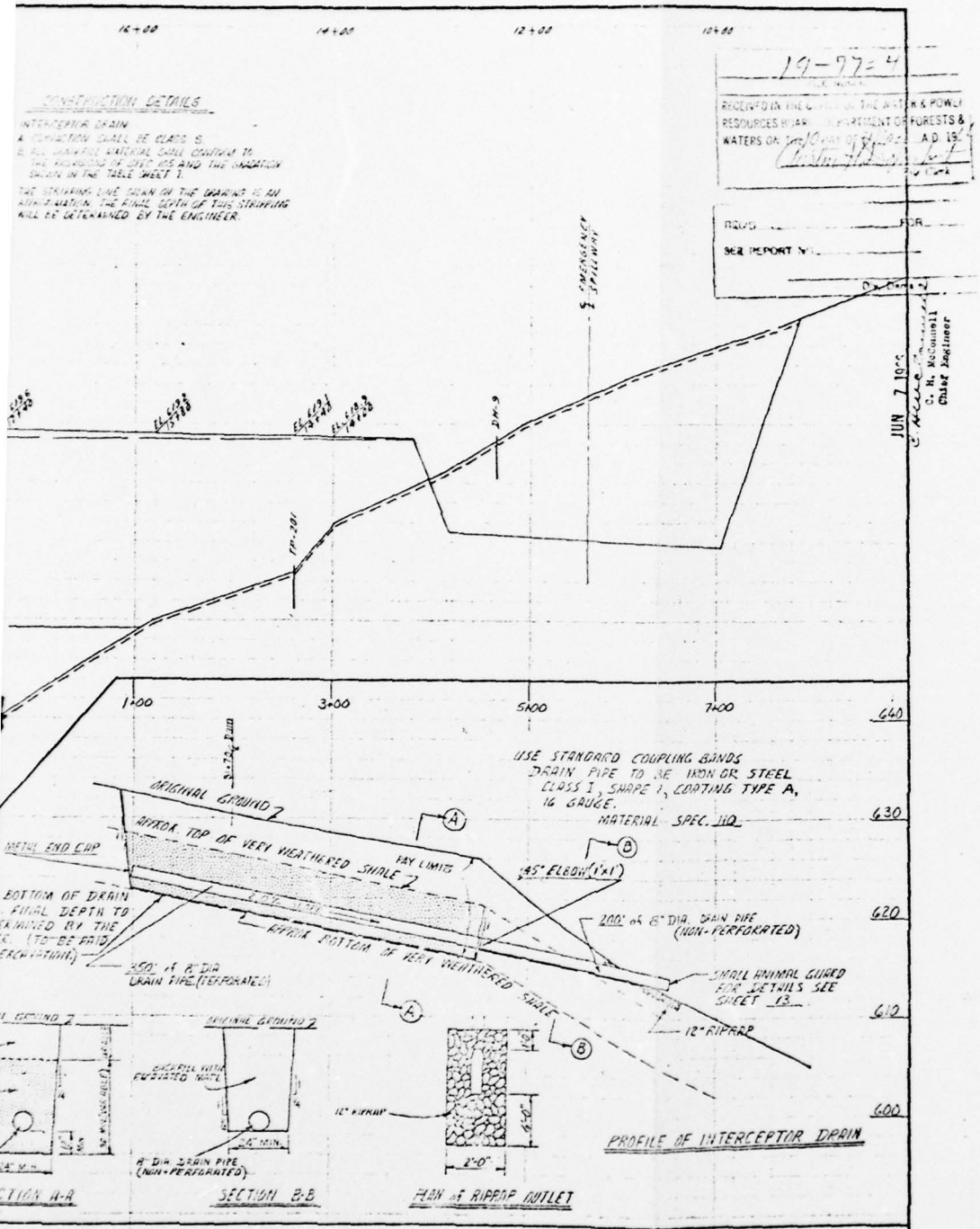
ALIGNMENT PLAN

MAY 1979 PLATE 3

SPILLWAY

2


30+00
24+00
22+00
20+00
18+00
CONSTRUCTION EL.
TOP OF SETTLED FILL EL. 598.5
ORIGINAL GROUND
APPROX. STRIPPING LINE
FINAL DEPTH TO BE DETERMINED BY THE ENGINEER (TO BE PAID FOR AS EXCAVATION)
℄ PRINCIPAL SPILLWAY
NORMAL POOL 593.2
DH-1
DH-2
DH-3
DH-4
DH-5
DH-6
SEE SHEETS 11, 12, 16, 19 & 20 FOR LOGS OF DRILL HOLES & TEST PITS.
PROFILE ALONG ℄ DAM
LOOKING DOWNSTREAM
ORIGINAL GROUND
APPROX. STRIPPING LINE
FINAL DEPTH TO BE DETERMINED BY THE ENGINEER (TO BE PAID FOR AS EXCAVATION)
LEVEL SECTION
EL. 610.0
38'
2 1/2% SLOPE
2 1/2% SLOPE
FLOW
0+00
4+00
6+00
8+00
10+00
PROFILE ALONG ℄ OF EMERGENCY SPILLWAY
BACKFILL WITH EXCAVATED MATERIAL
DRAIN FILL
HAY WITH WIRE TIES
6" DIA. DRAIN PIPE (PERFORATED)
SECTION
TYPICAL



19-77=44

RECEIVED IN THE OFFICE OF THE ... RESOURCES BY THE DEPARTMENT OF ... FORESTS & WATERS ON THE ... DAY OF ... A.D. 19...

APPD. ... FOR ...

SCS REPORT NO. ...

JUN 7 1965

C. H. McDonell
Chief Engineer

BRIAR CREEK WATERSHED
MULTIPLE PURPOSE DAM PA-497
COLUMBIA COUNTY, PENNSYLVANIA
PROFILES OF DAM & EMERGENCY SPILLWAY
U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Designed	Date	Approved by	
R. Herman	12-65	Title	
Traced C. Crise	12-65	Title	
Checked James H. Robertson	12-65	Sheet No. 4 of 20	Drawing No. PA-497-P

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

BRIAR CREEK DAM

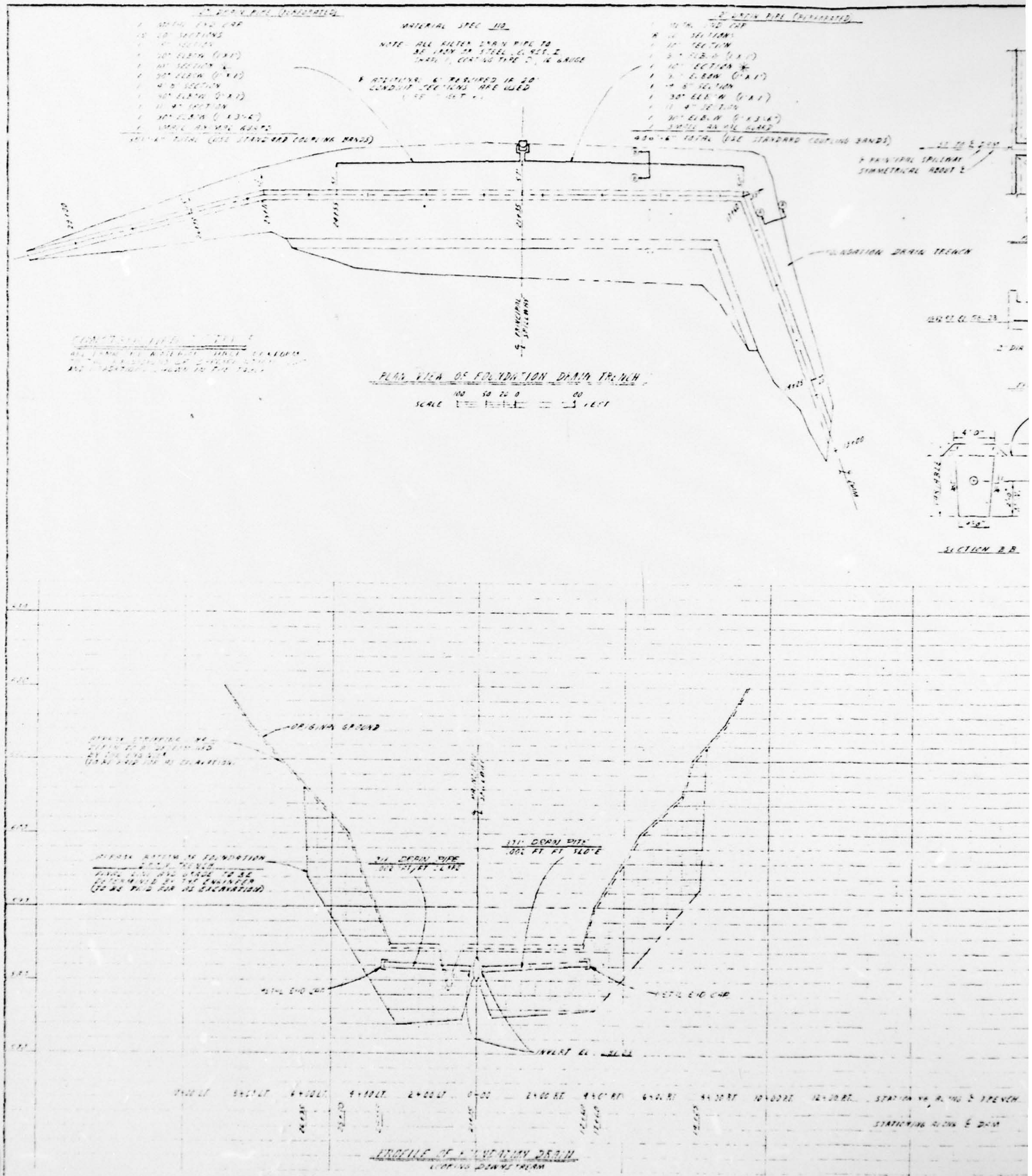
PENNSYLVANIA FISH COMMISSION

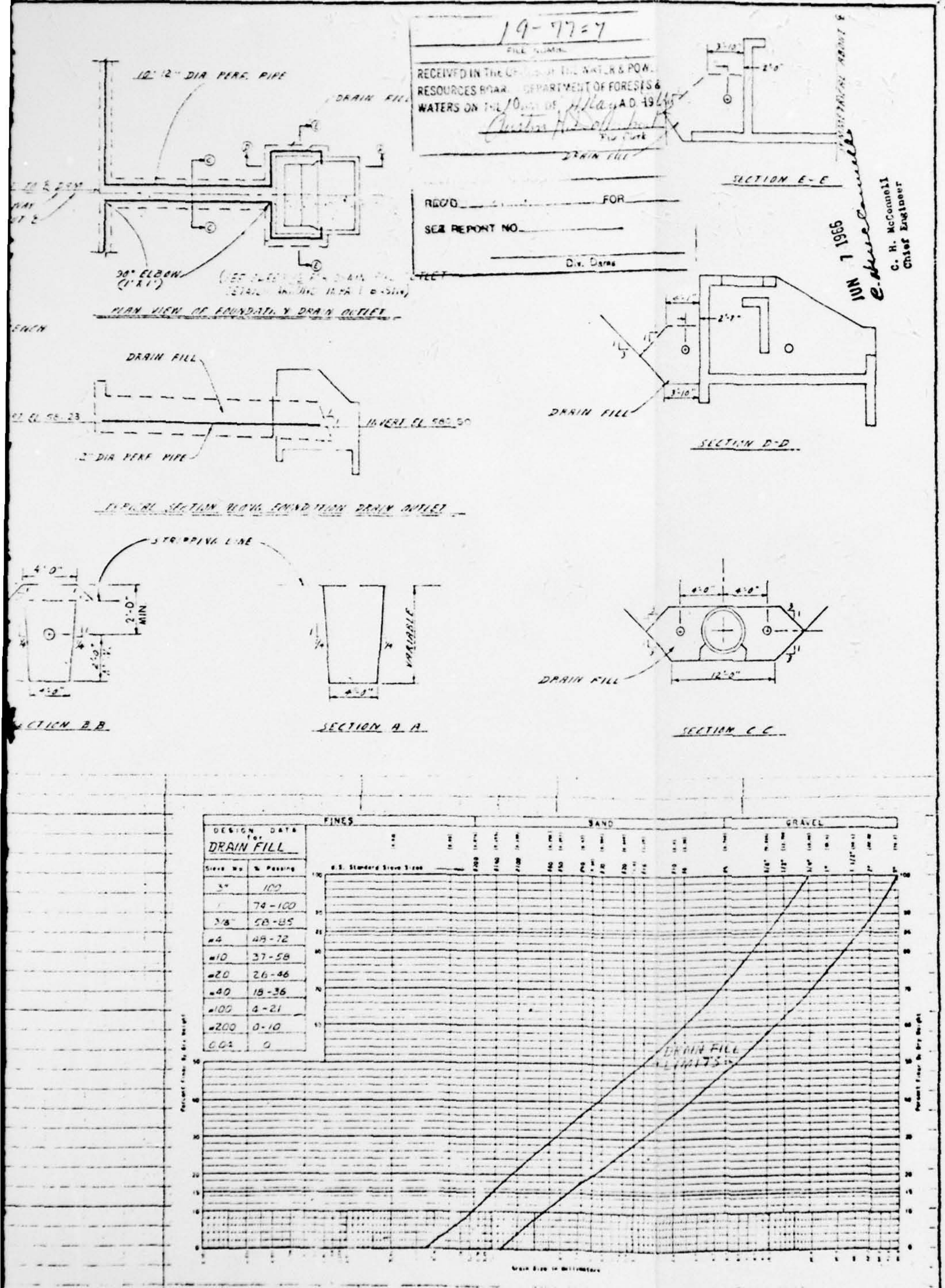
PROFILES

MAY 1979 PLATE 4

2

Form SCS-316 (November 1955)


MATERIAL SPEC 110
NOTE - ALL FILTER DRAIN PIPE TO BE IRON OR STEEL CL ASS I, CORTING TYPE C, 16 GAUGE
(USE STANDARD COUPLING BANDS)
FOUNDATION DRAIN TRENCH
PRINCIPAL SPILLWAY SYMMETRICAL ABOUT ℄
℄ PRINCIPAL SPILLWAY
PLAN VIEW OF FOUNDATION DRAIN TRENCH
SCALE
FEET
SECTION B-B
ORIGINAL GROUND
DRAIN PIPE
METAL END CAP
INVERT EL.
STATION NO. ALONG ℄ TRENCH
STATIONING ALONG ℄ DAM
PROFILE OF FOUNDATION DRAIN
LOOKING DOWNSTREAM



DESIGN DATA for DRAIN FILL

Sieve No.	% Passing
3"	100
[illegible]	74-100
3/8"	58-85
#4	48-72
#10	37-58
#20	26-46
#40	15-36
#100	4-21
#200	0-10
0.002	0

BRIAR CREEK WATERSHED
MULTIPLE PURPOSE DAM PA-497
COLUMBIA COUNTY, PENNSYLVANIA
FOUNDATION DRAIN DETAILS

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Designed 12-65
C. Crise 12-'65
Traced
Sheet 7 of 20 Drawing No. PA-497-P

Form SCS-317 November 1953

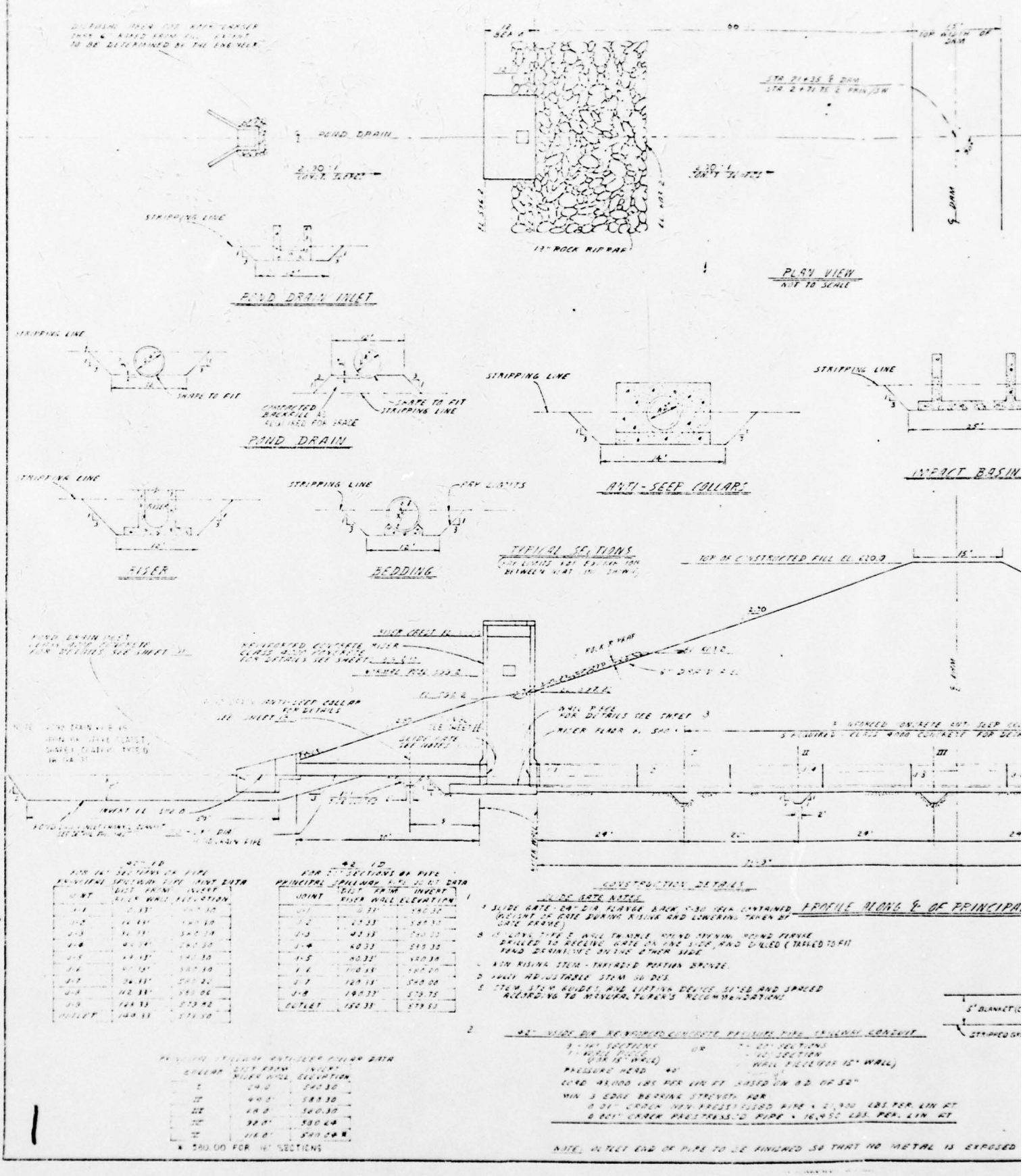
PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

BRIAR CREEK DAM

PENNSYLVANIA FISH COMMISSION

DRAIN PLAN

MAY 1979 PLATE 5

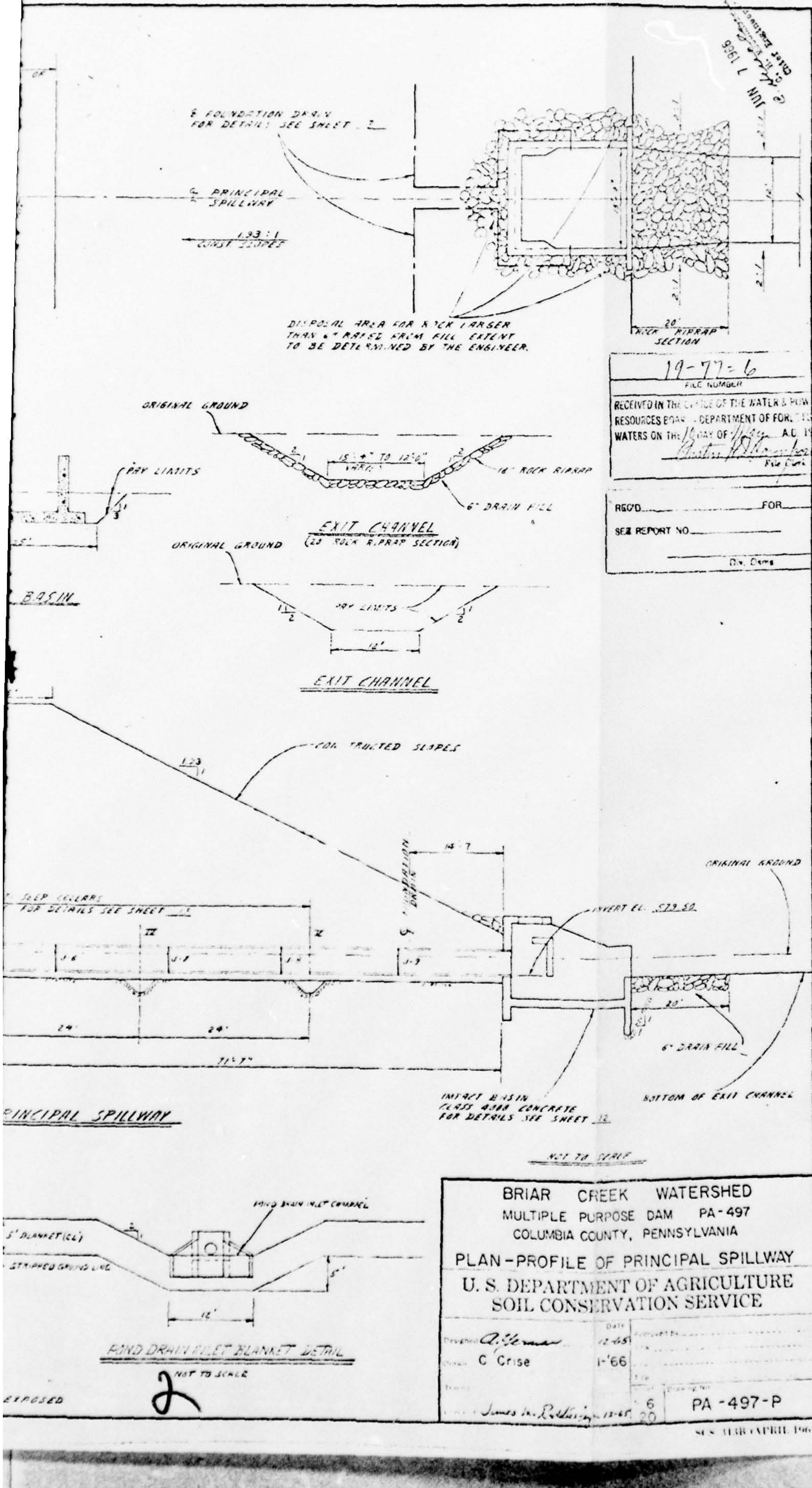


JOINT	DIST FROM RISER WALL	INVERT ELEVATION
1-1	0.33'	590.30
1-2	14.33'	589.30
1-3	31.33'	588.30
1-4	48.33'	587.30
1-5	65.33'	586.30
1-6	82.33'	585.30
1-7	99.33'	584.30
1-8	116.33'	583.30
1-9	133.33'	582.30
OUTLET	150.33'	581.30

JOINT	DIST FROM RISER WALL	INVERT ELEVATION
1-1	0.33'	590.30
1-2	23.33'	589.30
1-3	43.33'	588.30
1-4	63.33'	587.30
1-5	83.33'	586.30
1-6	103.33'	585.30
1-7	123.33'	584.30
1-8	143.33'	583.30
OUTLET	163.33'	582.30

SECTION	DIST FROM RISER WALL	INVERT ELEVATION
I	24.0'	592.30
II	40.0'	588.30
III	68.0'	580.30
IV	92.0'	580.64
V	116.0'	580.64

* 580.00 FOR 18" SECTIONS



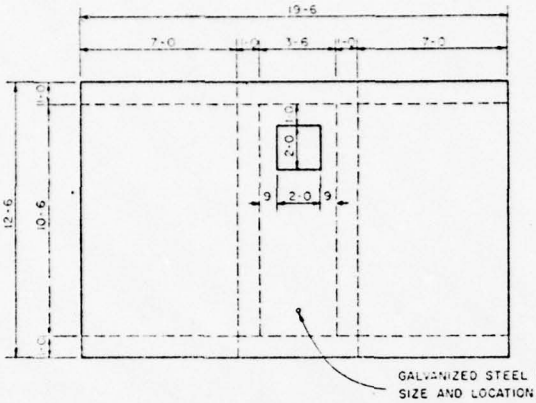
PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

BRIAR CREEK DAM

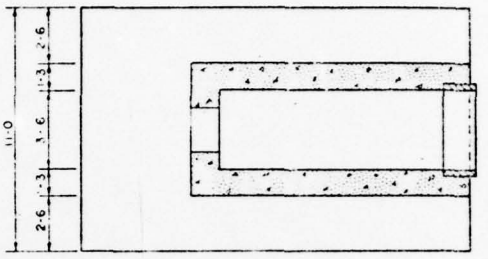
PENNSYLVANIA FISH COMMISSION

MAIN SPILLWAY
AND OUTLET WORKS

MAY 1979 PLATE 6



TOP PLAN



SECTION A-A

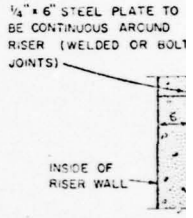
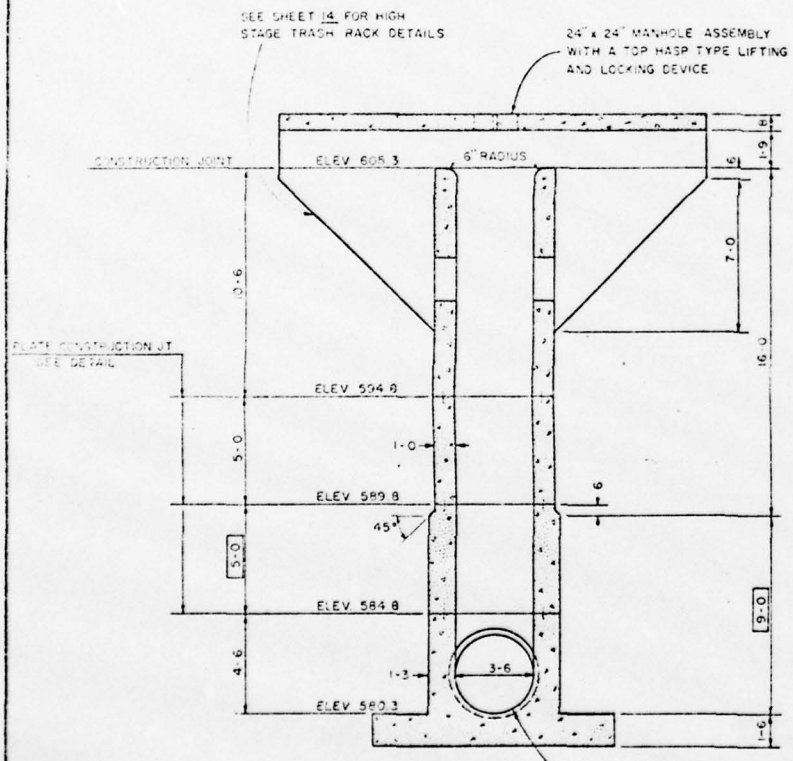


PLATE
JOI

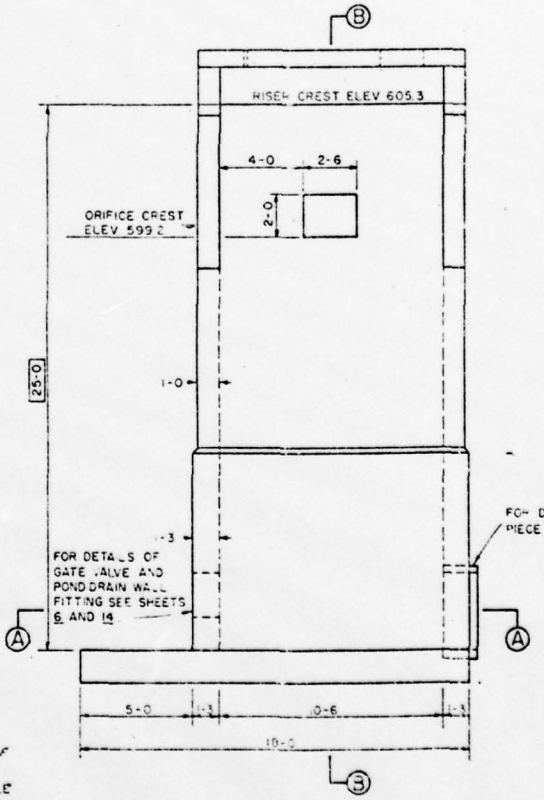
ANTI-SEEP CO

MARK	LOCATION	QUAN	SIZ
C-1	COLLARS	40	4
C-2		30	4
C-3		30	4
C-4		25	4
C-5		50	4



SECTION B B

POND BOTTOM MAY BE
OBTAINED BY USE OF A PIPE
CUT LONGITUDINALLY IN HALF
OR BY A REMOVABLE SEMI-
CIRCULAR FORM ACCEPTABLE
TO THE ENGINEER



SIDE WALL ELEVATION

REIN
NO
NO
NO
NO
NO

CON
CLA

STEEL SCHEDULE

MARK	LOCATION	QUAN	SIZE	LENGTH	TYPE	B	C	D	TOTAL FT.
1	RISER	36	6	10-6	1				378.00
2		22	6	17-6	1				385.00
3		10	6	7-0	1				70.00
4		26	10	12-3	21	4-6	7-9		318.50
5		7	6	9-9	21	2-0	7-9		68.25
6		8	6	3-0	1				24.00
7		30	6	6-9	1				[illegible]
8		24	6	10-3	21	3-0	7-3		246.00
9		3	6	9-3	21	2-0	7-3		27.75
10		64	5	6-9	1				432.00
11		8	5	12-6	19		2-6	10-0	100.00
12		8	5	3-6	1				28.00
13		8	5	4-6	1				36.00
14		8	5	5-6	1				44.00
15		8	5	6-6	1				52.00
16		8	5	7-6	1				60.00
17		8	5	8-6	1				68.00
18		24	5	12-6	1				300.00
19		44	5	10-3	1				451.00
20		4	6	8-3	21	1-0	7-3		33.00
21		4	6	8-0	21	0-9	7-3		32.00
22		6	6	7-9	21	0-6	7-3		46.50
23		2	6	8-9	21	1-6	7-3		17.50
24		164	5	10-9	21	3-8	7-1		1763.00
25		20	6	11-0	21	3-9	7-3		220.00
26		58	5	11-3	1				652.50
27		50	5	4-3	1				212.50
28		22	6	4-3	1				93.50
29		22	6	11-3	1				247.50
30		4	5	6-3	1				25.00
31		4	5	8-3	1				33.00
32		4	5	10-3	1				41.00
33		4	5	12-3	1				49.00
34		4	5	14-3	1				57.00
35		4	5	16-3	1				65.00
36		4	5	18-3	1				73.00
37		8	5	19-0	1				152.00
38		28	4	19-0	1				532.00
39		8	4	8-3	1				66.00
40		32	5	8-9	21	1-9	7-0		280.00
41		2	5	9-9	21	1-9	8-0		19.50
42		2	5	3-3	21	1-9	1-6		6.50
43		16	6	12-0	1				192.00
44		2	4	8-0	1				16.00
45		8	8	9-0	21	1-9	7-3		72.00
46		4	8	12-0	1				48.00
47		2	4	1-6	1				3.00
48		38	6	4-6	1				171.00
49		34	5	3-9	1				127.50

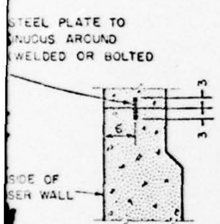
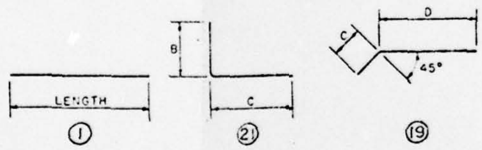


PLATE CONSTRUCTION
JOINT DETAIL

(A)NTI-SEEP COLLAR STEEL SCHEDULE

(L)OCATION	QUAN	SIZE	LENGTH	TYPE				TOTAL FT.
(CO)LLARS	40	4	8-0	1				320.00
	30	4	1-3	1				37.50
	30	4	1-6	1				45.00
	25	4	12-6	1				312.50
	50	4	3-8	1				183.33

TOTAL 898.33 LIN. FT. 600 LBS.



BAR TYPES

FOR CONSTRUCTION DETAILS SEE SHEET 13

0 1 2 3 4 8 FEET

...WALL
...T 13

STANDARD COVERED RISER	
DESIGN CONSTANTS	$f'_c = 4000$ psi, $n = 8$, $f_c = 1600$ psi, $f_s = 20{,}000$ psi
STANDARD DRAWING	42 - 2520E
DATE JAN 18, 1966	SHEET 1 OF 3

QUANTITIES (RISER ONLY)

REINFORCING STEEL

NO 4 BARS 617.00 LIN FT 412.2 LBS.
NO 5 BARS 5127.50 LIN FT 5348.0 LBS.
NO 6 BARS 2454.50 LIN FT 3686.7 LBS
NO 8 BARS 120.00 LIN FT 320.4 LBS.
NO. 10 BARS 318.50 LIN FT 1370.5 LBS.
TOTAL 11,137.8 LBS

CONCRETE

CLASS 4000 55.4 CU. YDS.

2

BRIAR CREEK WATERSHED
MULTIPLE PURPOSE DAM PA-497
COLUMBIA COUNTY, PENNSYLVANIA
RISER DETAILS

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Designed A. Yerman 12-65 | Approved by ....
Drawn R. A. STALTER JAN-66 | Title ....
Traced .... | Title ....
Checked Alfred A. Smaley 12-65 | Sheet No. 8 of 20 | Drawing No. PA-497-P

SCS-313 C (9-54)

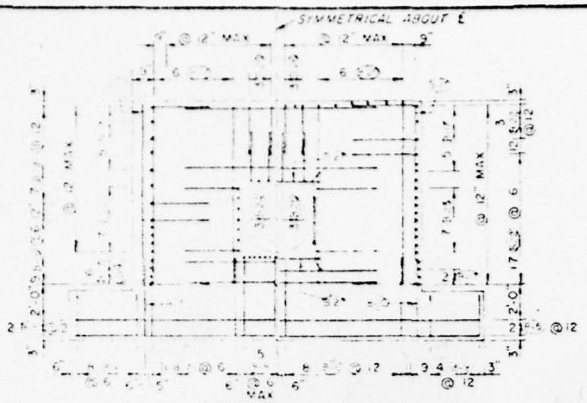
PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

BRIAR CREEK DAM

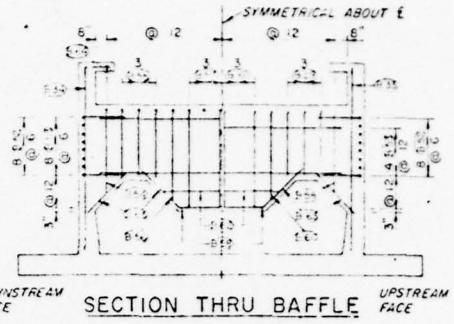
PENNSYLVANIA FISH COMMISSION

MAIN SPILLWAY RISER

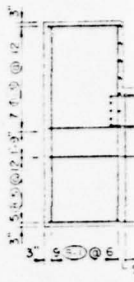
MAY 1979 PLATE 7

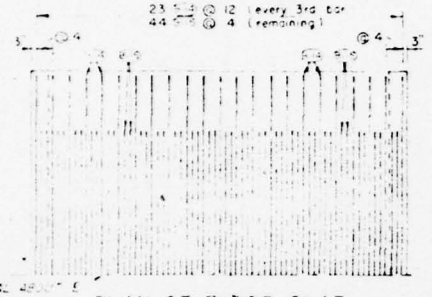


SECTION D - D

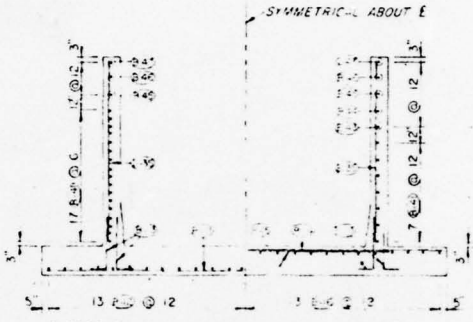


SECTION THRU BAFFLE



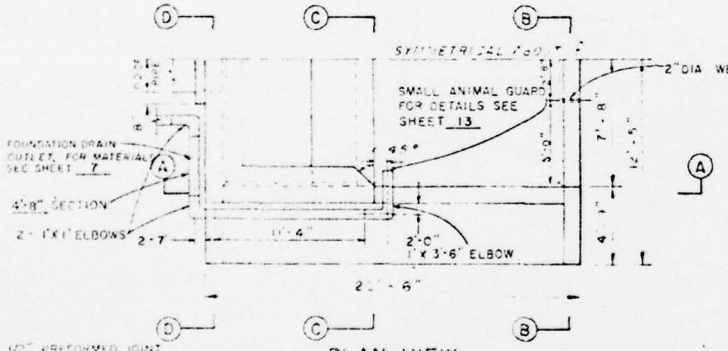


PLAN OF FLOOR SLAB

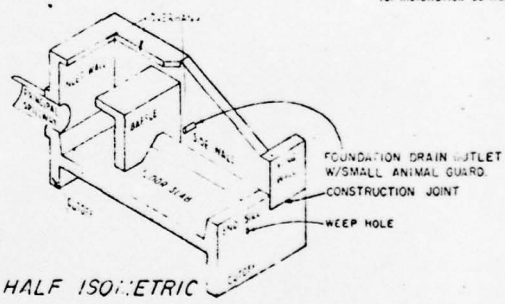


SECTION C-C

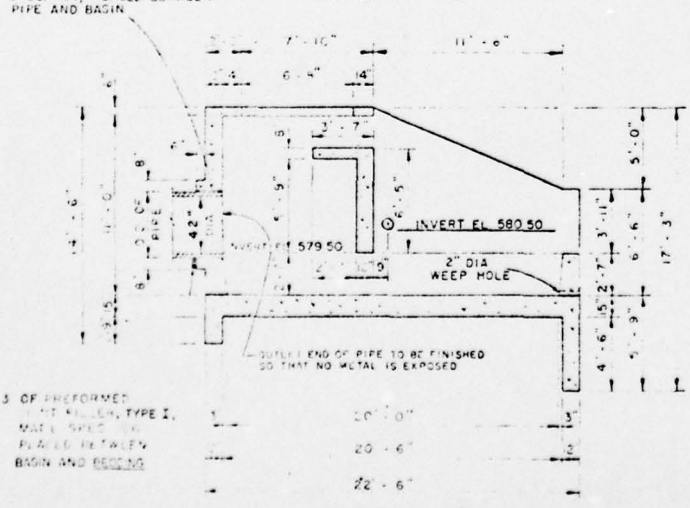
DRAIN PIPE
Bend reinforcing steel for installation as necessary



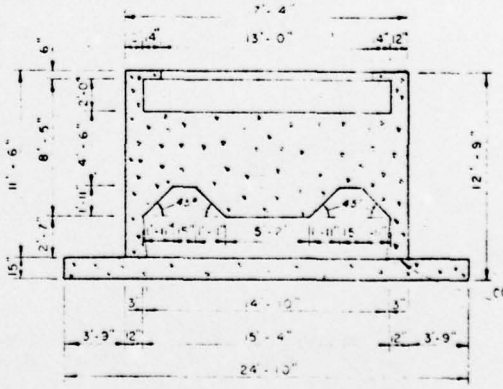
PLAN VIEW



HALF ISOMETRIC

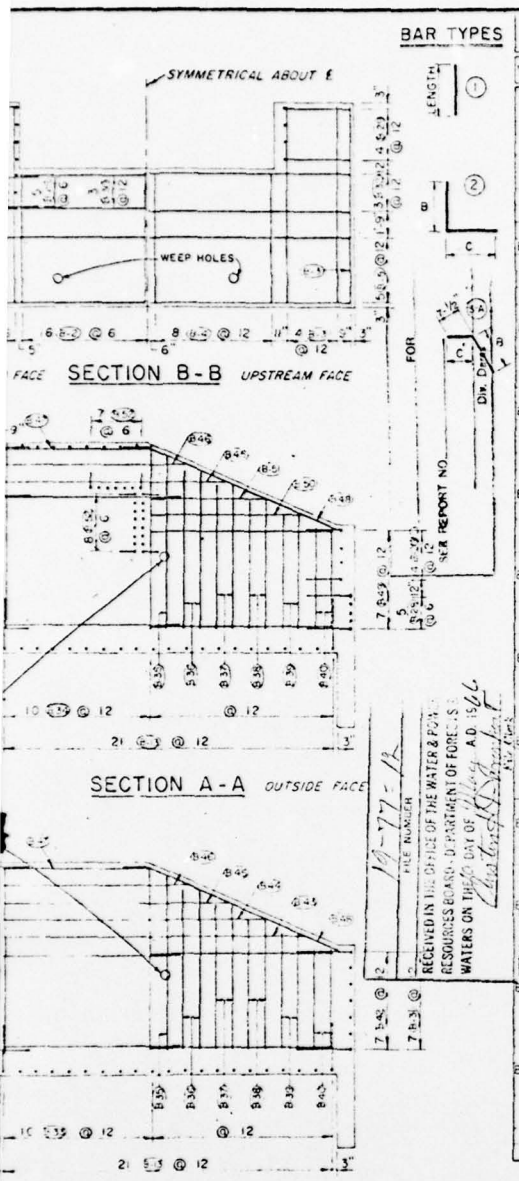


SECTION ON ℄



SECTION THRU BAFFLE

CONSTRUCTION DETAILS SEE SHEET 13



STEEL SCHEDULE

MARK	LOCATION	QUAN	SIZE	LENGTH	TYPE	B	C	TOTAL FT
B-1	CUTOFF	18	8	11-9	1			211 50
2		32	8	7-9	1			246 00
3		10	5	11-9	1			117 50
4	"	16	5	7-9	1			124 00
B-5		14	5	24-6	1			343 00
6		16	6	2-6	1			40 00
7		24	6	4-6	1			108 00
8		9	6	5-9	2	4-9	1-0	51 75
9		8	5	2-5	1			20 00
B-10		18	5	4-	1			81 00
11	FLOOR SLAB	23	5	24-6	1			563 50
12		25	5	22-0	1			550 00
13		84	5	3-10	2	2-10	1-0	322 00
14		23	7	24-6	1			563 50
B-15		44	8	17-3	1			759 00
16		25	8	22-0	1			550 00
17	INLET WALL	34	5	11-0	1			374 00
18		18	6	6-1	2	4-0	2-1	109 50
19		14	5	6-1	2	4-0	2-1	85 17
B-20		12	5	12-9	2	11-0	1-9	153 00
21		14	6	4-3	2	3-3	1-0	59 50
22		40	7	7-1	2	4-6	2-7	283 33
23		14	5	3-3	1			45 50
24		6	5	4-0	2	3-0	1-0	24 00
B-25		12	5	3-0	1			36 00
26		6	5	4-9	2	3-0	1-9	28 50
27		8	5	4-6	1			36 00
28	WING WALLS	10	6	4-9	2	2-10	1-11	47 50
29		8	5	5-9	2	3-9	2-0	46 00
B-30		3	5	16-3	1			48 75
31		14	7	7-6	2	4-3	3-3	105 00
32		3	6	24-6	1			73 50
33	SIDE WALLS	20	5	11-0	1			220 00
34		20	5	12-9	2	11-0	1-9	255 00
B-35		4	5	10-6	1			42 00
36		8	5	9-9	1			78 00
37		8	5	8-9	1			70 00
38		8	5	8-0	1			64 00
39		8	5	7-0	1			56 00
40		8	5	6-3	1			50 00
41		48	5	10-9	1			516 00
42		14	7	11-6	1			161 00
43		2	5	18-3	1			36 50
44		2	5	15-9	1			31 50
B-45		4	5	13-6	1			54 00
46		4	5	11-3	1			45 00
47		4	5	8-9	1			35 00
48		4	5	14-1	3-A	12-6	1-7	56 33
49		14	5	11-6	1			161 00
B-50		2	5	9-3	1			18 50
51		2	5	7-0	1			14 00
52	BAFFLE	46	5	3-7	2	2-7	1-0	164 83
53		16	5	15-0	1			240 00
54		2	5	8-4	2	5-3	3-1	16 67
B-55		6	5	7-1	2	4-0	3-1	42 50
56		2	5	8-7	2	5-6	3-1	17 17
57		5	5	9-1	2	6-0	3-1	45 42
58		4	5	5-0	1			20 00
59		6	5	4-0	1			24 00
B-60		2	5	5-6	1			11 00
61		5	5	6-0	1			30 00
62		2	5	7-0	1			14 00
63		8	5	3-6	1			28 00
64	OVERHANG	2	5	7-6	1			15 00
65		1	5	14-0	1			14 00

QUANTITIES THIS SHEET ONLY

REINFORCING STEEL

NO 5 BARS	5482 8	LIN FT	5118 6 LBS
NO 6 BARS	489 8	LIN FT	735 7 LBS
NO 7 BARS	1112 8	LIN FT	2274 6 LBS
NO 8 BARS	1768 50	LIN FT	4721 9 LBS
		TOTAL	13,451 LBS

CONCRETE

CLASS 4000 63.6 CU YDS

0 1 2 3 6 FEET
SCALE

JUN 7 1966

C. H. McConnell
Chief Engineer

BRIAR CREEK WATERSHED
MULTIPLE PURPOSE DAM PA-497
COLUMBIA COUNTY, PENNSYLVANIA
IMPACT BASIN DETAILS

U S DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

F O Parley 11/64
M. NIKOLICH
[illegible] 1/65 12
[illegible] 11/64 20

PA-497-P

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

BRIAR CREEK DAM

PENNSYLVANIA FISH COMMISSION

IMPACT BASIN

MAY 1979 PLATE 8

SUSQUEHANNA RIVER BASIN

EAST BRANCH BRIAR CREEK, COLUMBIA COUNTY

PENNSYLVANIA

BRIAR CREEK DAM

NDI ID No. PA-00651
DER ID No. 19-77
SCS ID No. PA-497

PENNSYLVANIA FISH COMMISSION

PHASE I INSPECTION REPORT

NATIONAL DAM INSPECTION PROGRAM

MAY 1979

APPENDIX A

CHECKLIST - ENGINEERING DATA

CHECKLIST

ENGINEERING DATA

DESIGN, CONSTRUCTION, AND OPERATION
PHASE I

NAME OF DAM: BRIAR CREEK

NDI ID NO.: PA-00651 DER ID NO.: 19-77

Sheet 1 of 4

ITEM	REMARKS
AS-BUILT DRAWINGS	IN SCS FILES NO CHANGES EXCEPT depth OF CUTOFF AND DRAIN TRENCHES (MINOR)
REGIONAL VICINITY MAP	SEE PLATE 1.
CONSTRUCTION HISTORY	WELL detailed IN PennDER FILES
TYPICAL SECTIONS OF DAM	SEE PLATE 2
OUTLETS: Plan Details Constraints Discharge Ratings	SEE PLATES 6&7 NO DISCHARGE RATINGS

A-1

ENGINEERING DATA

ITEM	REMARKS
RAINFALL/RESERVOIR RECORDS	NONE
DESIGN REPORTS	HYDRAULIC design ANALYSIS IN PENNDER FILES. ANALYSIS by SCS.
GEOLOGY REPORTS	DETAILED IN PENNDER FILES SUMMARIES IN APPENDIX E.
DESIGN COMPUTATIONS: Hydrology and Hydraulics Dam Stability Seepage Studies	H&H COMPUTATIONS COMPLETE STABILITY AND SEEPAGE SUMMARIES ATTACHED AT END
MATERIALS INVESTIGATIONS: Boring Records Laboratory Field	COMPLETE INVESTIGATION done SUMMARY IN APPENDIX E
POSTCONSTRUCTION SURVEYS OF DAM	NONE

ENGINEERING DATA

ITEM	REMARKS
BORROW SOURCES	NOTED ON PLATE 2
MONITORING SYSTEMS	NONE
MODIFICATIONS	NONE
HIGH POOL RECORDS	TROPICAL STORM AGNES - JUNE 1972 INFORMATION FROM CARETAKER.
POSTCONSTRUCTION ENGINEERING STUDIES AND REPORTS	NONE
PRIOR ACCIDENTS OR FAILURE OF DAM: Description Reports	TROPICAL STORM AGNES: SINK HOLES IN AUXILIARY SPILLWAY SLIDE UPSTREAM OF AUXILIARY SPILLWAY

ENGINEERING DATA

ITEM	REMARKS
MAINTENANCE AND OPERATION RECORDS	NO FORMAL RECORDS.
SPILLWAY: Plan Sections Details	SEE PLATES 3, 6, 7 AND 8
OPERATING EQUIPMENT: Plans Details	PLANS AND DETAILS AVAILABLE.
PREVIOUS INSPECTIONS Dates Deficiencies	1970 - RESEEDING AND DRESSING NEEDED. 1971 - RILLS ON EMBANKMENT NEEDED, AS IS DRESSING OF VEGETATION. 1972 - (AUGUST 11) - MOWING NEEDED, SLIDE IN EMERGENCY SPILLWAY 1972 - (AUGUST 21) - MOWING NEEDED, SLIDE IN EMERGENCY SPILLWAY, 2 SINKHOLES (11'x11'x8') AND (14'x8'x4') IN EMERGENCY SPILLWAY BOTTOM. 1973 - NEEDS MOWING, CLEARING OF DEBRIS AT MAIN SPILLWAY, AND RESEEDING OF SINKHOLE AREAS.

ENGINEERING DATA

ITEM	REMARKS
PREVIOUS INSPECTIONS (CONTINUED)	1974 - RECOMMENDS ELIMINATION OF TRAIL BIKE TRAFFIC ON EMBANKMENT. 1975 - NEEDS MOWING. NOTES PLANNED INSTALLATION OF LOCK ON HATCH AT MAIN SPILLWAY. 1976 - NEEDS MOWING 1977 - NO DEFICIENCIES 1978 - NEEDS MOWING COMPLETED. STEM OF GATE IS UNCOUPLED OR BROKEN, GROUND HOGS IN BANKS OF SPILLWAY, DEBRIS IN RESERVOIR

To be used to report to field offices data used for slope stability analyses and the results of the analyses. The right side of the form will be used for a sketch of the embankment on which the analyses have been made.

10-58

SOIL CONSERVATION SERVICE

SOIL MECHANICS LABORATORY Sta 12+30

SUMMARY - SLOPE STABILITY ANALYSIS

State [illegible] Project [illegible] #P5497

Date 5-27-65 Analysis Made By [illegible] Checked By [illegible]

Method of Analysis [illegible]

Location of Material					Emb. 25% Ext. Mat.		Emb. 25% Ext. Mat.			
Sample No.					[illegible]		[illegible]			
γ_d					91.0		124.0			
γ_m					114.0		135.0			
γ_s					119.5		140.5			
γ_b					[illegible]		[illegible]			
Condition	Opt.	Sat.	Opt.	Sat.	Opt.	Sat.	Opt.	Sat.	Opt.	Sat.
ϕ						20°		34°		
Tan ϕ						.364		.675		
K										
C						700		100		

UPSTREAM SLOPE

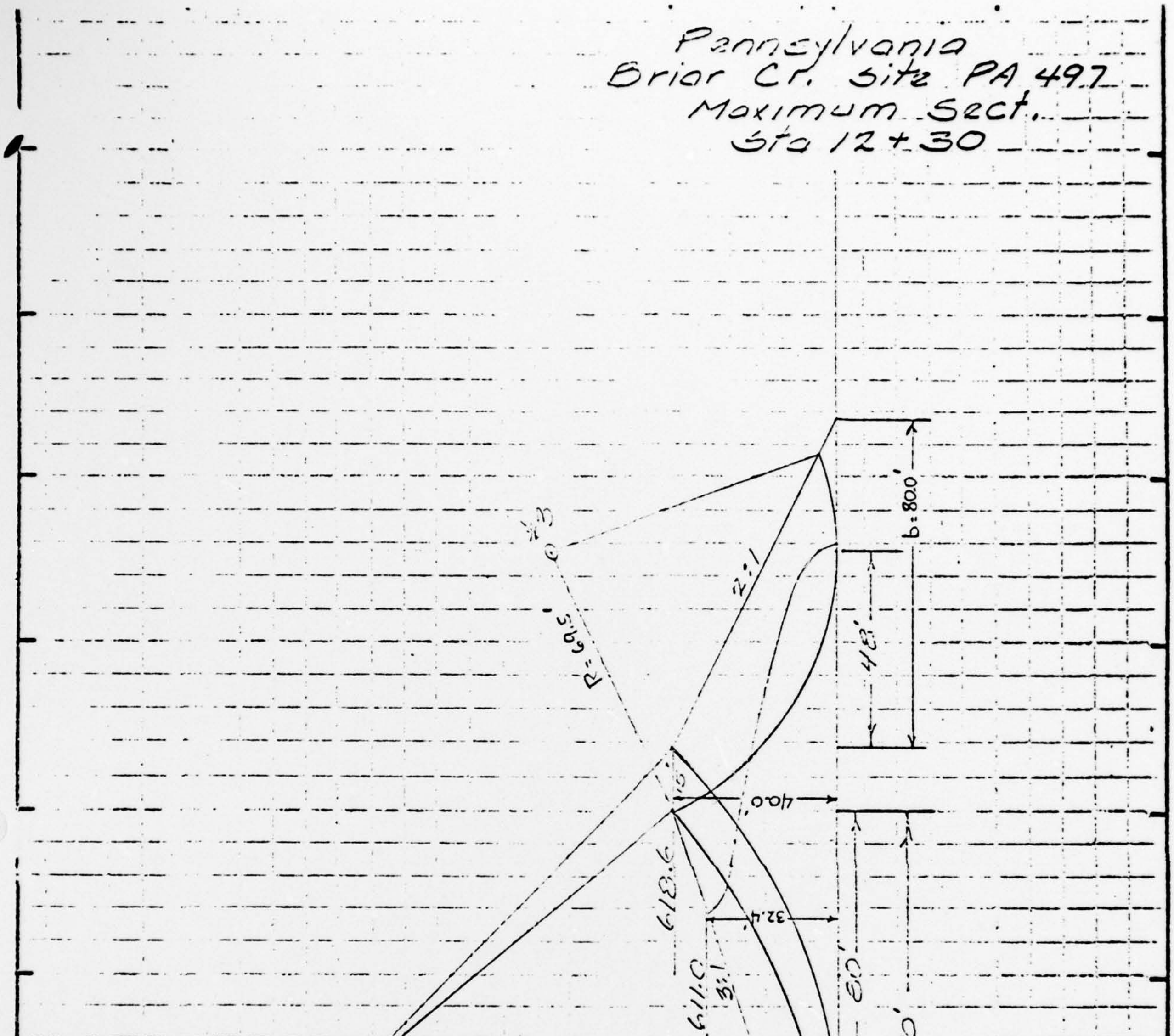
Trial	Slope	Conditions	Fs
1	3:1	Full drawdown - foot berm at el. 599.7	
		are in same slide thru emb = 34°-100	1.62
1A	3:1	Same, except emb = 20°-700	3.2
2	3:1	Full drawdown - foot berm at el. 599.2	
		are from one slide thru emb = 20°-700	2.4
2A	3:1	Same, except emb = 34°-100	1.67

DOWNSTREAM SLOPE

Trial	Slope	Conditions	Fs
3	2:1	Drain at toe = ab, no berm, are from	
		one slide thru emb = 20°-700	2.2
3A	2:1	Same, except emb = 34°-100	1.77

A-6

GPO : 1959 O - 509368

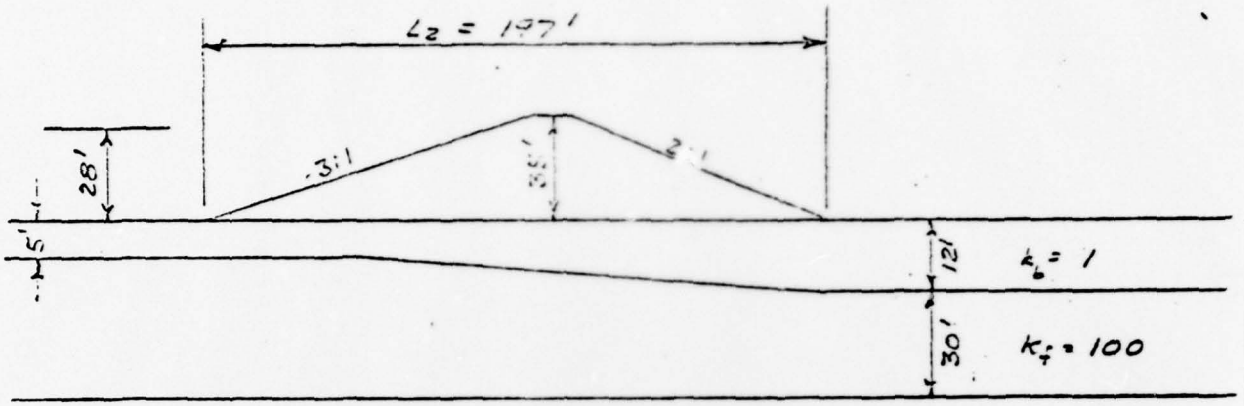


Scale 1 inch = Feet

PA. BRIAR CR. PA-497

EN 9-8-65

SEEPAGE PRESSURE 1 1



$$L_1 = \sqrt{\frac{100 \cdot 5 \cdot 30}{1}} = \sqrt{15000} = 123'$$

$$L_3 = \sqrt{\frac{100 \cdot 12 \cdot 30}{1}} = \sqrt{36000} = 190'$$

$$L_1 + L_2 + L_3 = 510$$

$$h_o = \frac{.25 \times 190}{510} = 10.4'$$

ASSUMING γ_b OF BLANKET IS 62.5 PCF

$$h_c = 12 \times 1 = 12'$$

$$F_S = \frac{12}{10.4} = 1.15$$

SUSQUEHANNA RIVER BASIN

EAST BRANCH BRIAR CREEK, COLUMBIA COUNTY

PENNSYLVANIA

BRIAR CREEK DAM

NDI ID No. PA-00651
DER ID No. 19-77
SCS ID No. PA-497

PENNSYLVANIA FISH COMMISSION

PHASE I INSPECTION REPORT

NATIONAL DAM INSPECTION PROGRAM

MAY 1979

APPENDIX B

CHECKLIST - VISUAL INSPECTION

CHECKLIST

VISUAL INSPECTION

PHASE I

Name of Dam: BRIAR CREEK County: COLUMBIA State: PENNSYLVANIA

NDI ID No.: PA-00651 DER ID No.: 19-77

Type of Dam: ZONED EARTHFILL Hazard Category: HIGH

Date(s) Inspection: 9,10 APRIL 1979 Weather: WINDY & CLEAR Temperature: 40°F

SOIL - VERY MOIST - HEAVY RAIN ON 9 APRIL - INSPECTION DELAYED

Pool Elevation at Time of Inspection: 600.2 msl/Tailwater at Time of Inspection: 580.7 msl

Inspection Personnel:

E. WEAVER (SCS) D. WOLF (GFCC)

D. CHAMP (CCC) D. EBERSOLE (GFCC)

F. FARVER (CCC)

A. WHITMAN (GFCC) Recorder

EMBANKMENT

Sheet 1 of 2

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SURFACE CRACKS	NONE	
UNUSUAL MOVEMENT OR CRACKING AT OR BEYOND THE TOE	NONE	
SLOUGHING OR EROSION: Embankment Slopes Abutment Slopes	TRAILS, CAUSED BY FOOT TRAFFIC*, IN EMBANKMENT. * AND TRAIL BIKES.	MINOR 2 TRAILS NEAR LT. ABUTMENT UPSTREAM 1 TRAIL NEAR OUTLET WORKS DOWNSTREAM
CREST ALIGNMENT: Vertical Horizontal	HORIZONTAL - NO DEFICIENCIES VERTICAL - SEE SHEETS FOLLOWING INSPECTION NOTES.	
RIPRAP FAILURES	NONE	RIPRAP EXTENDS UP TO EL. 603.6±

B-2

EMBANKMENT

Sheet 2 of 2

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
JUNCTION OF EMBANKMENT WITH: Abutment Spillway Other Features	NO DEFICIENCIES	
ANY NOTICEABLE SEEPAGE	TOE NEAR OUTLET WORKS IS WET.	CCC TEMPERATURE AS USUALLY DRY - PROBABLY WET FROM RAINS ON PREVIOUS DAY.
STAFF GAGE AND RECORDER	NONE	
DRAINS	NOT VISIBLE	

OUTLET WORKS

Sheet 1 of 1

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CRACKING AND SPALLING OF CONCRETE SURFACES IN OUTLET CONDUIT	FLOWING 2/3 FULL	NOT INSPECTED
INTAKE STRUCTURE	SUBMERGED	
OUTLET STRUCTURE	VERY MINOR SPALLING - NOT A DEFICIENCY	SMALL TREE IMMEDIATELY TO RIGHT OF STRUCTURE
OUTLET CHANNEL	EARTHEN RIPRAP IS UNEVENLY PLACED.	
EMERGENCY GATE	SUBMERGED	

MAIN
~~UNGATED~~ SPILLWAY

Sheet 1 of 1

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONCRETE WEIR	RISER PIPE - NOT VISIBLE	
APPROACH CHANNEL	RESERVOIR.	
DISCHARGE CHANNEL	SEE OUTLET WORKS OUTLET	
BRIDGE AND PIERS	NONE	

B-5

AUXILIARY ~~GATED~~ SPILLWAY

Sheet 1 of 1

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONCRETE SILL	GRASS LINED CONTROL SECTION	SEE SURVEY DATA 3 - SINKHOLES (FILLED POST-TROPICAL STORM AGNES - NO MOVEMENT SINCE)
APPROACH CHANNEL	GRASS LINED	SLIDE IN RIGHT BANK 200'± UPSTREAM FROM CONTROL SECTION
DISCHARGE CHANNEL	GRASS LINED	BURROWING ANIMALS IN BANKS AND BOTTOM
BRIDGE AND PIERS	NONE	
GATES AND OPERATION EQUIPMENT	NONE	

INSTRUMENTATION

Sheet 1 of 1

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
MONUMENTATION/SURVEYS	NONE	
OBSERVATION WELLS	NONE	
WEIRS	NONE	
PIEZOMETERS	NONE	
OTHER		

RESERVOIR AND WATERSHED

Sheet 1 of 1

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SLOPES	GENTLE AT DAMSITE	FAIRLY STEEP IN WATERSHED UPSTREAM
SEDIMENTATION	SOME, AS NOTED BY DAMTENDER	INCLUDED IN design OF dAM - NOT A DEFICIENCY
WATERSHED DESCRIPTION	AT DAMSITE: GENTLE GRASSED SLOPES - RURAL DEVELOPMENT	WATERSHED: STEEP AND WOODED - VERY MINOR development

B-8

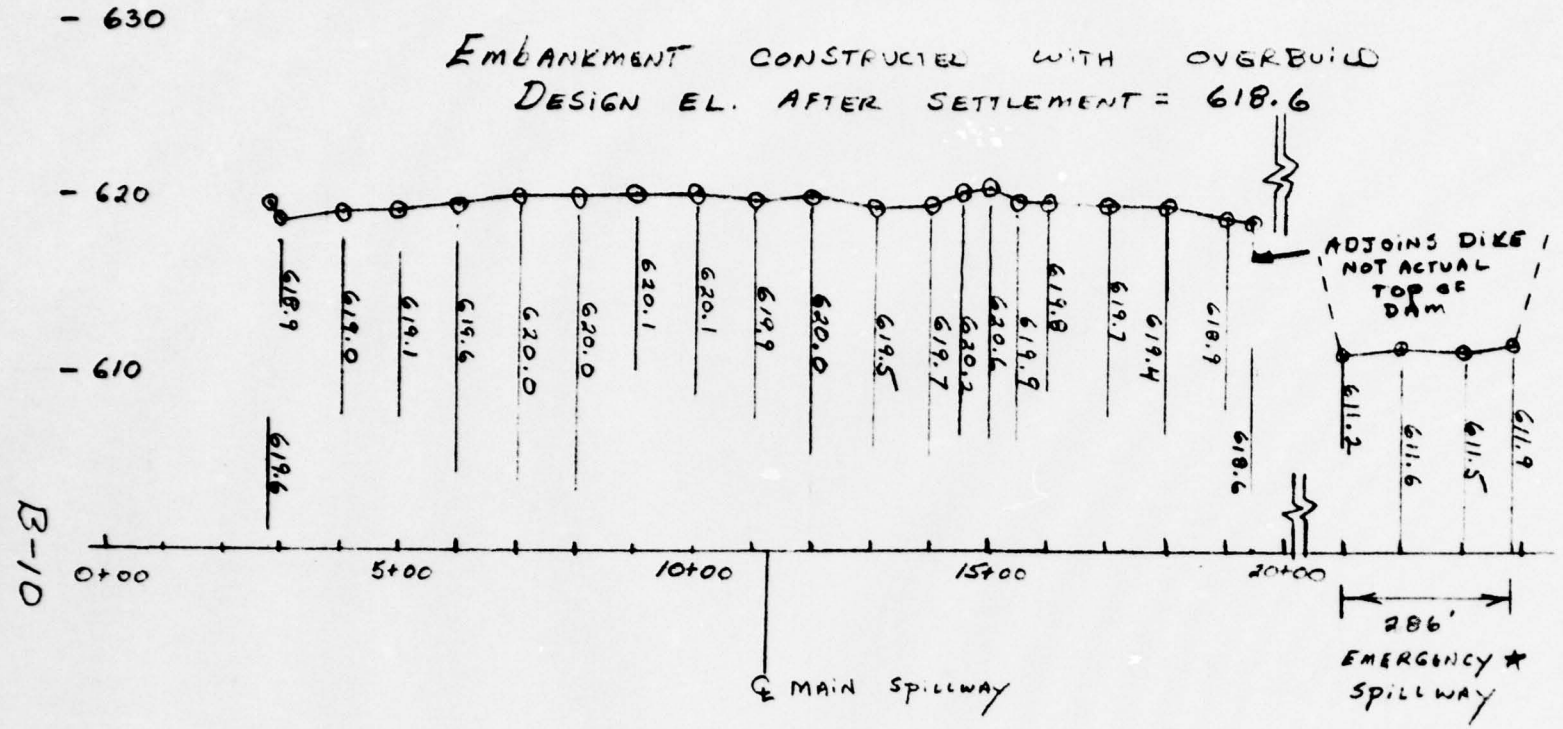
DOWNSTREAM CHANNEL

Sheet 1 of 1

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONDITION: Obstructions Debris Other	CLEAR	
SLOPES	BANKS LOW AND STEEP	
APPROXIMATE NUMBER OF HOMES AND POPULATION	BERWICK AND BRIAR CREEK	40+ HOMES IN FLOODPLAIN

GANNETT FLEMING CORDDRY AND CARPENTER, INC.
HARRISBURG, PA.

SUBJECT BRIAR CREEK FILE NO.
FOR SHEET NO. OF SHEETS
COMPUTED BY DATE CHECKED BY DATE



B-10

PROFILE - LOOKING DOWNSTREAM
DATUM = TOP OF INTAKE STRUCTURE
EL 607.72

★ DESIGN LENGTH IS 280'. AS THE GRASSED CREST IS NOT WELL DEFINED, THE MEASUREMENT MAY HAVE BEEN MADE ON A SKEW. USE 280' FOR LENGTH.

GANNETT FLEMING CORDDRY
AND CARPENTER, INC.
HARRISBURG, PA.

SUBJECT BRIAR CREEK FILE NO.

SHEET NO. OF SHEETS

FOR

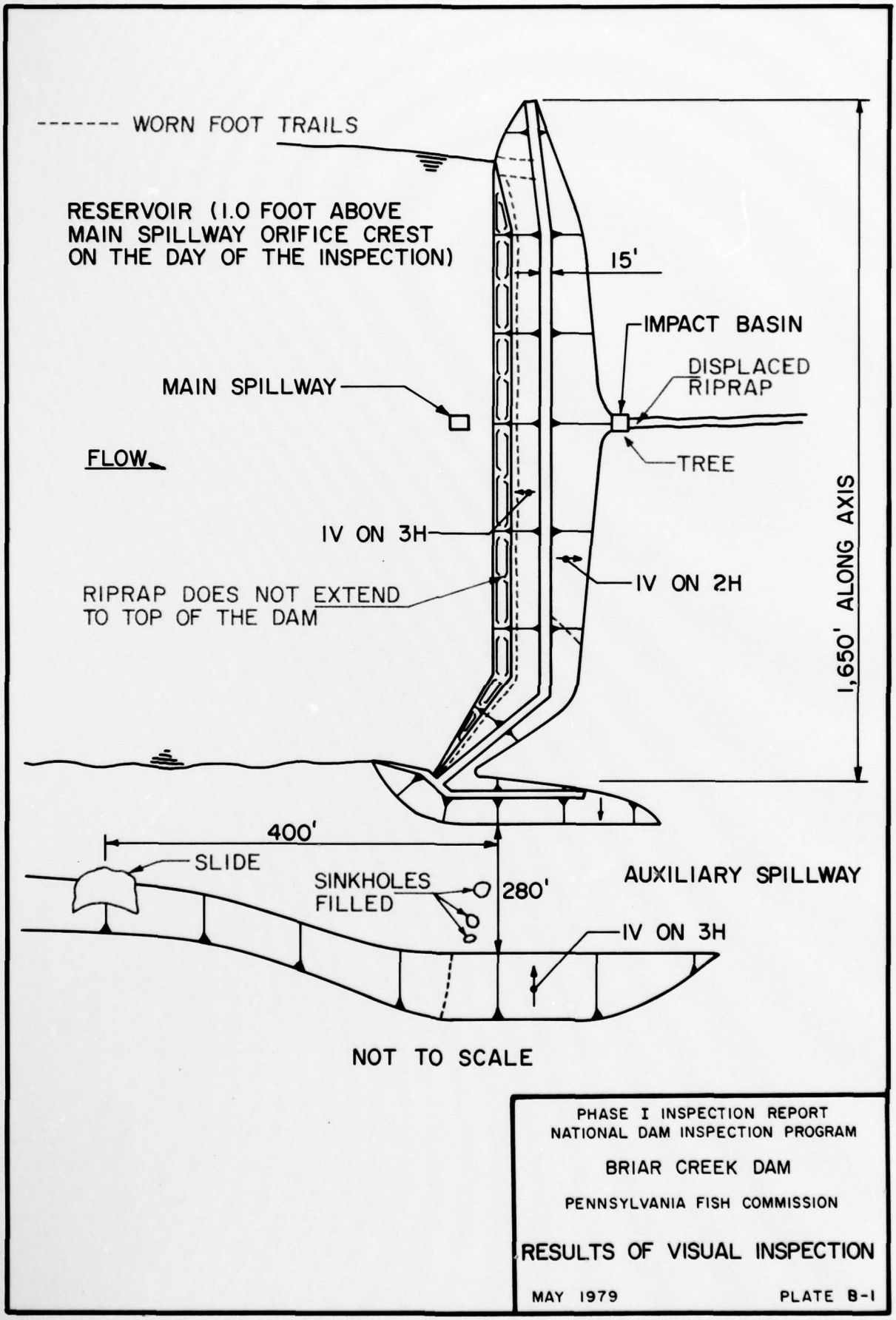
COMPUTED BY DATE CHECKED BY DATE

TAILWATER EL 580.7
ENDSILL EL 579.4
PIPE INVERT 579.3±

SECTION AT STATION 11+00
SCALE 1" = 20'

B-11

8519



PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

BRIAR CREEK DAM

PENNSYLVANIA FISH COMMISSION

RESULTS OF VISUAL INSPECTION

MAY 1979 PLATE B-1

SUSQUEHANNA RIVER BASIN

EAST BRANCH BRIAR CREEK, COLUMBIA COUNTY

PENNSYLVANIA

BRIAR CREEK DAM

NDI ID No. PA-00651
DER ID No. 19-77
SCS ID No. PA-497

PENNSYLVANIA FISH COMMISSION

PHASE I INSPECTION REPORT

NATIONAL DAM INSPECTION PROGRAM

MAY 1979

APPENDIX C

HYDROLOGY AND HYDRAULICS

APPENDIX C

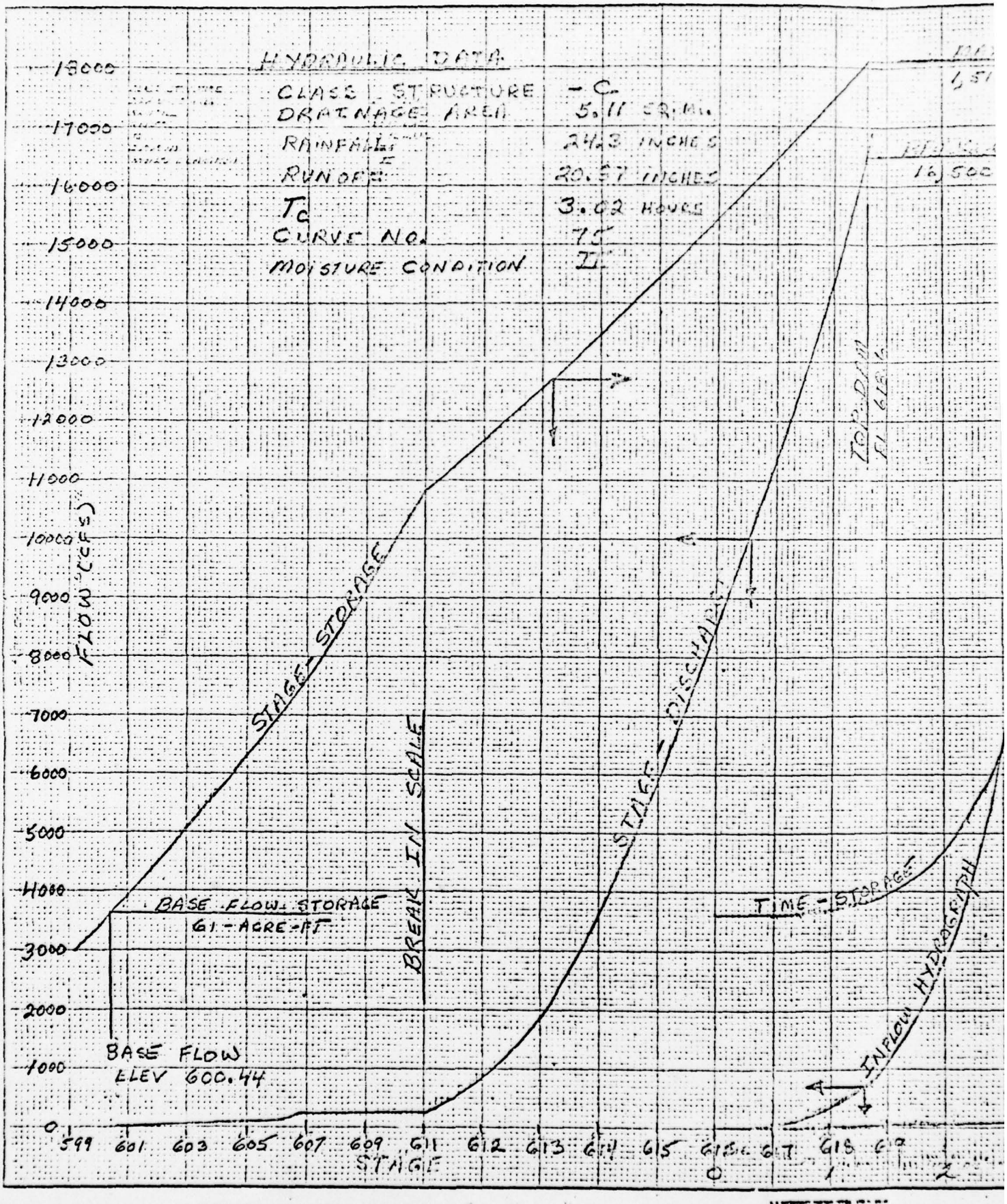
HYDROLOGY AND HYDRAULICS

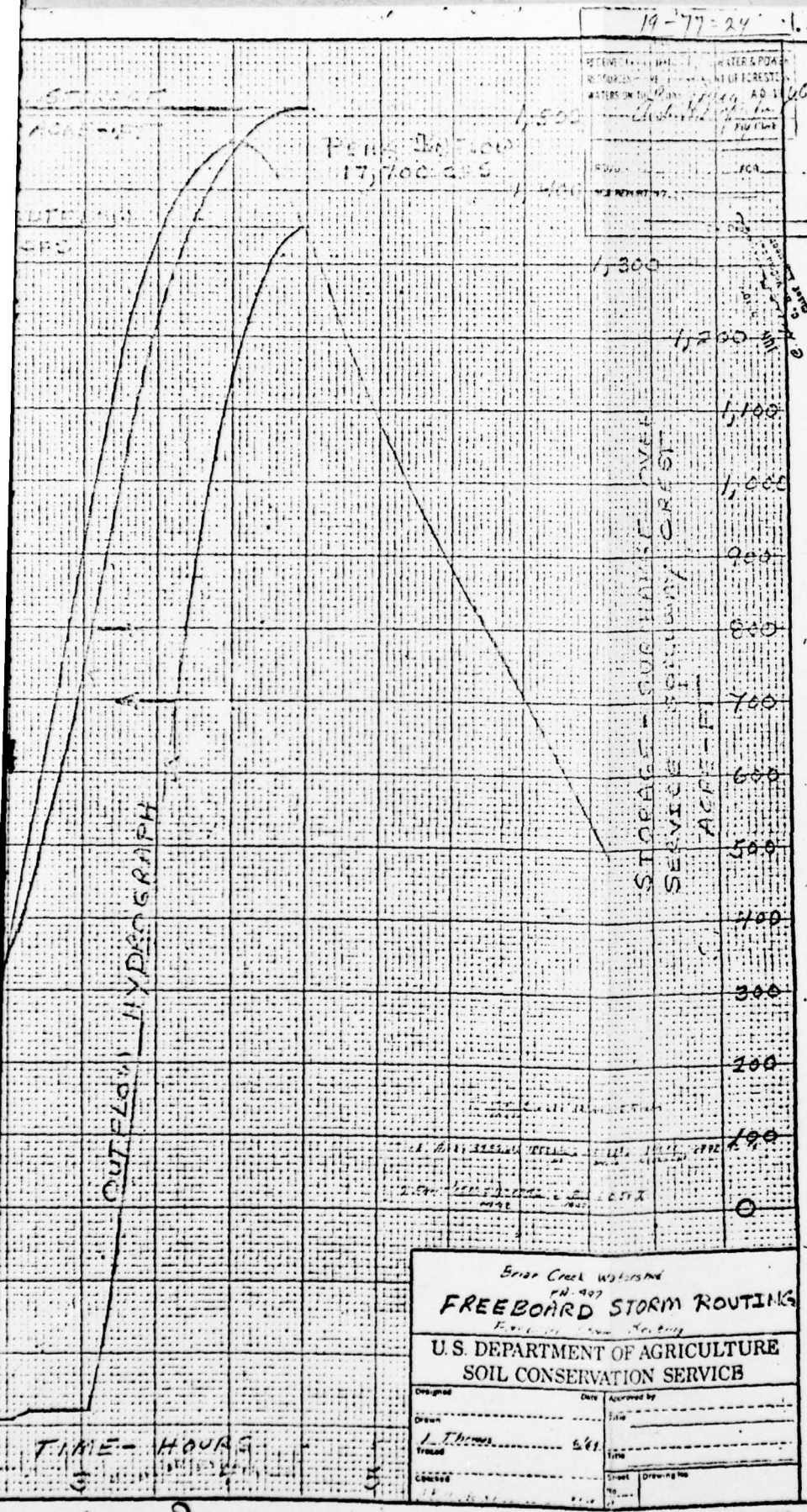
In the recommended Guidelines for Safety Inspection of Dams, the Department of the Army, Office of the Chief of Engineers (OCE), established criteria for rating the capacity of spillways. The recommended Spillway Design Flood (SDF) for the size (small, intermediate, or large) and hazard potential (low, significant, or high) classification of a dam is selected in accordance with the criteria. The SDF for those dams in the high hazard category varies between one-half of the Probable Maximum Flood (PMF) and the PMF. If the dam and spillway are not capable of passing the SDF without overtopping failure, the spillway capacity is rated as inadequate. If the dam and spillway are capable of passing one-half of the PMF without overtopping failure, or if the dam is not in the high hazard category, the spillway capacity is not rated as seriously inadequate. A spillway capacity is rated as seriously inadequate if all of the following conditions exist:

(a) There is a high hazard to loss of life from large flows downstream of the dam.

(b) Dam failure resulting from overtopping would significantly increase the hazard to loss of life downstream from the dam from that which would exist just before overtopping failure.

(c) The dam and spillway are not capable of passing one-half of the PMF without overtopping failure.


HYDRAULIC DATA
CLASS STRUCTURE - C
DRAINAGE AREA 5.11 SQ. MI.
RAINFALL 24.3 INCHES
RUNOFF 20.57 INCHES
Tc 3.62 HOURS
CURVE NO. 75
MOISTURE CONDITION II
FLOW (CFS)
STAGE - STORAGE
STAGE - DISCHARGE
BREAK IN SCALE
BASE FLOW STORAGE
61 - ACRE-FT
BASE FLOW
ELEV 600.44
TIME - STORAGE
INFLOW HYDROGRAPH
STAGE
18000
17000
16000
15000
14000
13000
12000
11000
10000
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
599
601
603
605
607
609
611
612
613
614
615
616
617
618
619
0
1
2



Briar Creek Watershed
FN-907
FREEBOARD STORM ROUTING

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Designed | Date | Approved by
Drawn | Title
J. Thomas | 5/61
Traced | Title
Checked | Sheet No. | Drawing No.

Form SCS-315 (November 1955)

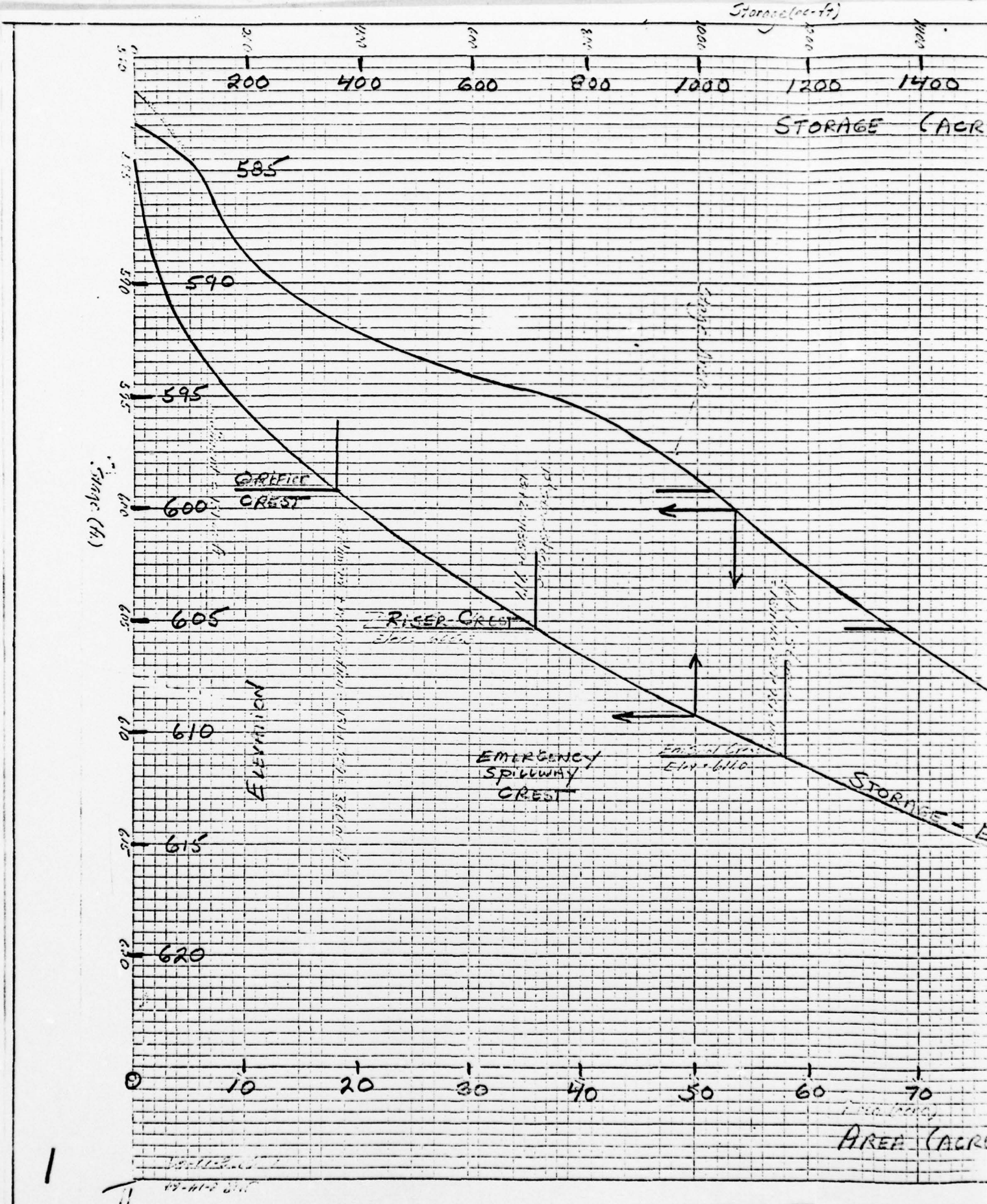
PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

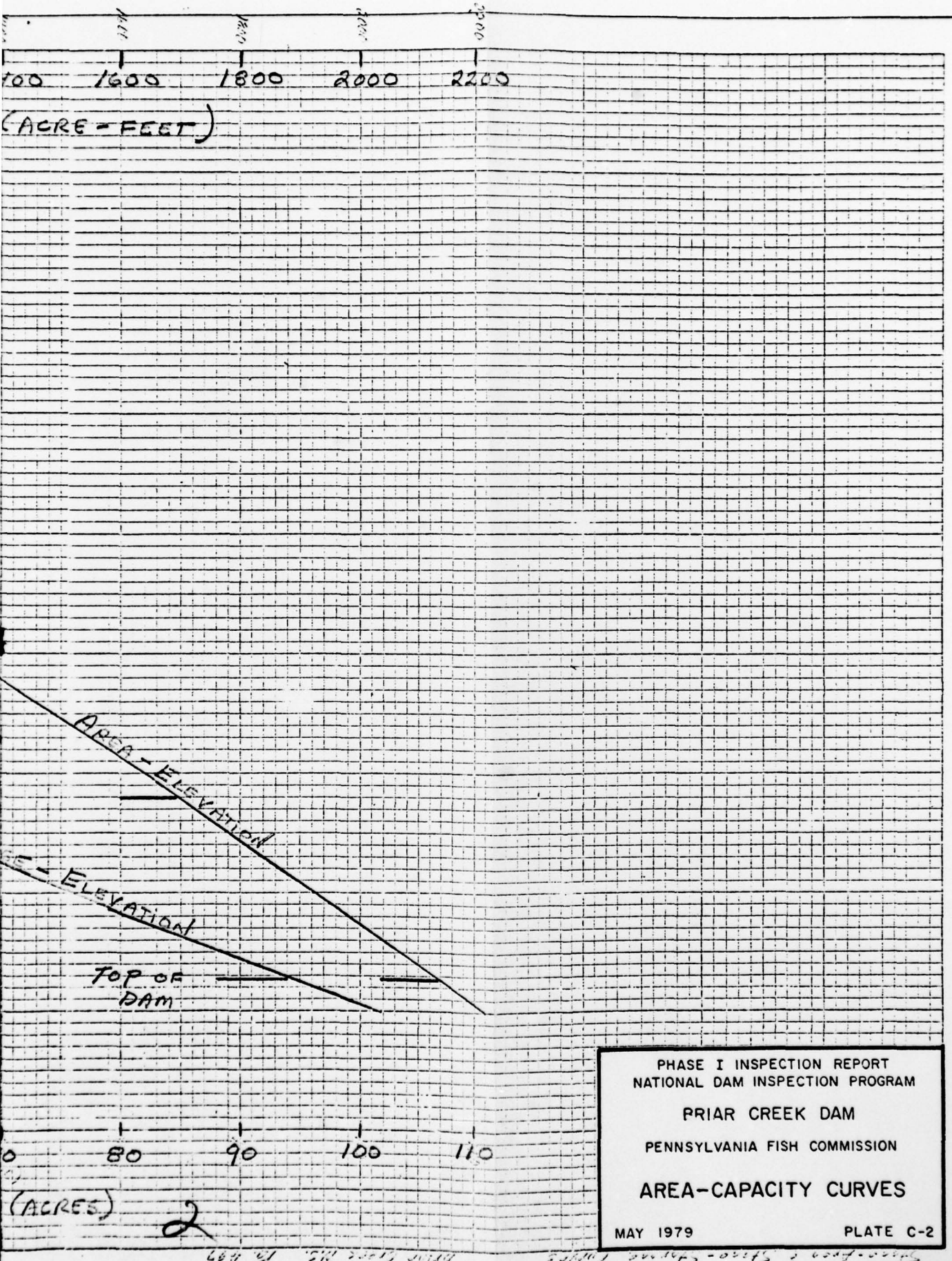
BRIAR CREEK DAM

PENNSYLVANIA FISH COMMISSION

FREEBOARD STORM ROUTING

MAY 1979 PLATE C-1


Storage (ac-ft)
200
400
600
800
1000
1200
1400
STORAGE (ACR
585
590
595
600
605
610
615
620
ELEVATION
ORIFICE CREST
RISER CREST
EMERGENCY SPILLWAY CREST
STORAGE
0
10
20
30
40
50
60
70
AREA (ACR



PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

PRIAR CREEK DAM

PENNSYLVANIA FISH COMMISSION

AREA-CAPACITY CURVES

MAY 1979 PLATE C-2

SCS-347 5-57
Tabular Computations

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Boise Creek Watershed

PA-992: Stage-Discharge Computations

	@600.2		52 (H)^½	Crest @ 605.3		65.1(Hw)^3/2	Crest @ 580		45.9 He^½		Crest @ 611.0
Stage	H	H^½	Q	Hw	Hw^3/2	Q	He	He^½	Q	[illegible]	Q
599.2	0										
600.2	0										
601.0	0.8	0.895	47							47	
601.5	1.3	1.14	59							59	
602.0	1.8	1.34	70							70	
603.0	2.8	1.67	87							87	
604.0	3.8	1.95	101							101	
605.3	5.1	2.26	118	0						118	
605.6	5.4	2.32	121	0.3	0.164	11	25.6	5.07	232	132	
606.0	5.8	2.41	125	0.7	0.573	38	26	5.10	234	163	
606.4	6.2	2.49	129	1.1	1.15	75	26.4	5.14	236	204	
606.6	6.4	2.53	131	1.3	1.48	96	26.6	5.16	237	227	
[illegible]	6.5	2.55	133	1.4	1.65	107	26.7	5.17	238	238	
8.0	—	—	—	—	—	—	28.0	5.29	243	243	
610.0	—	—	—	—	—	—	30.0	5.48	252	252	
611.0	—	—	—	—	—	—	31.0	5.57	256	256	0
612.76							32.76	5.72	262	262	5
613.65							33.65	5.80	266	266	10
614.39							34.39	5.86	269	269	15
615.04							35.04	5.92	272	272	20
616.14							36.14	6.02	276	276	30
617.14							37.14	6.10	280	280	40
618.05	—						38.05	6.17	283	283	50
618.82							38.82	6.23	286	286	60
Based on flow	52 H^½ = 25.5		H^½ =	0.491	H = 0.24						

∴ Base flow elev = 600.2 + 0.24 = 600.44

✓JMP 9-1-?4

Crest El. 611.0 Q	ES-124 Sh 3 of 7 L = 200' Hp	ES-98 Sh 2 of 4 dc	b=280 Z=1 Zdc+b	Qem	[illegible] Qall	Stage
					21	601
					33	601.5
					44	602.0
					61	603.0
					75	604.0
					92	605.3
					106	[illegible]
					137	606.0
					178	[illegible]
					201	606.6
					212	[illegible]
					217	[illegible]
					226	[illegible]
0					230	611.0
5	1.76	0.91	280.91	1,405	1641	612.8
10	2.65	1.46	281.46	2,815	3055	[illegible]
15	3.39	1.91	281.91	4,229	4472	[illegible]
20	4.04	2.32	282.32	5,646	[illegible]	615.0
30	5.14	3.05	283.05	8,492	8792	[illegible]
40	6.14	3.70	283.70	11,348	[illegible]	[illegible]
50	7.05	4.30	284.30	14,215	14472	618.05
60	7.82	4.85	284.85	17,091	17,351	[illegible]

2

GPO 863938

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

BRIAR CREEK DAM

PENNSYLVANIA FISH COMMISSION

HYDRAULIC COMPUTATIONS

MAY 1979 PLATE C-3

SUSQUEHANNA RIVER BASIN

EAST BRANCH BRIAR CREEK, COLUMBIA COUNTY

PENNSYLVANIA

BRIAR CREEK DAM

NDI ID No. PA-00651
DER ID No. 19-77
SCS ID No. PA-497

PENNSYLVANIA FISH COMMISSION

PHASE I INSPECTION REPORT

NATIONAL DAM INSPECTION PROGRAM

MAY 1979

APPENDIX D

PHOTOGRAPHS

A. Downstream Slope

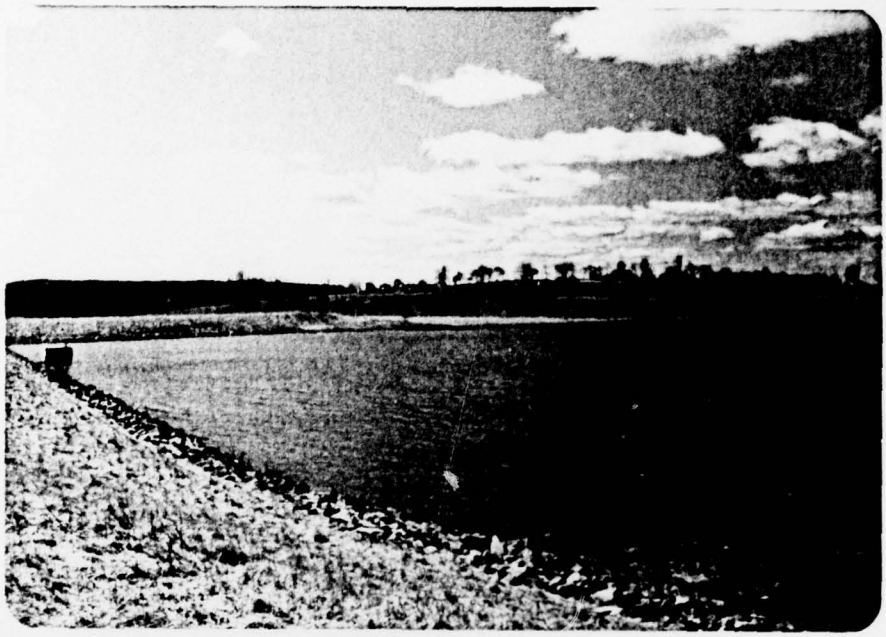
B. Upstream Slope

C. Riser Intake

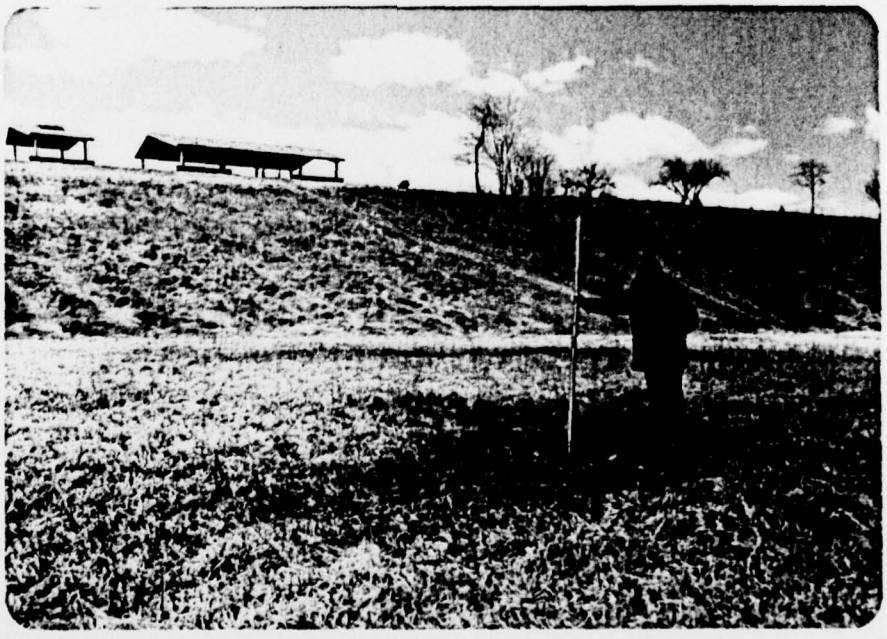
D. Downstream Toe

E. Impact Basin

F. Downstream Channel



G. Auxiliary Spillway Approach Channel



H. Sinkhole in Auxiliary Spillway

SUSQUEHANNA RIVER BASIN

EAST BRANCH BRIAR CREEK, COLUMBIA COUNTY

PENNSYLVANIA

BRIAR CREEK DAM

NDI ID No. PA-00651
DER ID No. 19-77
SCS ID No. PA-497

PENNSYLVANIA FISH COMMISSION

PHASE I INSPECTION REPORT

NATIONAL DAM INSPECTION PROGRAM

MAY 1979

APPENDIX E

GEOLOGY

BRIAR CREEK DAM

APPENDIX E

GEOLOGY

1. General Geology. The damsite and reservoir are located in Columbia County. Only a small part of Columbia County was covered by the last advance of ice, but traces of one and possibly two older stages of glaciation have been observed over the remainder of the county.

The rock formations exposed in Columbia County range in age from the Post-Pottsville formations down to the Clinton Formation. The youngest rocks, Pennsylvanian, are exposed along the southern, eastern, and northern borders of the county. The oldest rocks, of Silurian Age, are exposed only along Montour Ridge through the center of the county. Rocks of middle and upper Devonian Age crop out over the greater part of the county.

The rocks have been folded into seven alternating synclines and anticlines, which trend east or northeast. The folds interfinger with one another, the anticlines plunging to the east, the synclines rising to the west, so that progressively older beds are exposed on the anticlines toward the west and progressively younger beds are exposed on the synclines toward the east.

With the exception of the Northwest corner of Madison Township, which is drained by the West Branch of Susquehanna River, and the southern half of Conyngham Township, which is drained by Shamokin Creek into the main Susquehanna, all of Columbia County is drained by the North Branch of the Susquehanna River, which flows southwestward through the center of the county.

2. Site Geology. Briar Creek Dam is founded on rocks of the Hamilton Group of lower to middle Devonian Age in the Valley and Ridge Province. A detailed geologic investigation report for the design of the dam states that:

"Subsurface features of the site include steeply dipping shale, interglacial deposits of fine sand and recent alluvium of variable character. The foundation for the proposed structure is based on rock. The left abutment and flood plain are underlain by shales which dip to the south 10 to 45 degrees. These shales are weathered moderately deep on the left abutment to shallow on the flood plains due to the scouring and removal of weathered rock by stream action on successive glacial advances. The depth of the weathered and broken zone is generally about 15 feet. The right abutment is quite open due to fault breakage.

A strata of Illinoian till varying in thickness from 3 to 7 feet overlies the rock on both abutments. This material is basically a clay. The floodplain of the site is formed by 15 to 25 feet of unconsolidated soils overlying shales. The unconsolidated materials consist of 2 to 5 feet of alluvium overlying glacial drift. The alluvium is basically a silt with a low permeability rate."

Excerpts from the design analysis findings and conclusions concerning the dam are attached hereafter.

Sheet ___ of 3
For In-Service Use Only

10-59

DETAILED GEOLOGIC INVESTIGATION OF DAM SITES

Site ...na. County Columbia Watershed Briar Creek Subwatershed E. Branch, Briar Ck.

Site number PA-497 Site group _____ Structure class C Investigated by _____ Date: _____
(Signature and title)
Geologist

INTERPRETATIONS AND CONCLUSIONS

Dam site PA-497 is a complex of geologic features that will have vital impact on the design of the structure. Two locations were studied in the detailed geologic investigation. The first location was withdrawn when the Tonoloway limestone was found in a fault contact with the shales of the Hamilton group within the foundation of the structure. Although no large cavities were noted in the drilling of the foundation, a Tonoloway limestone quarry located 1,400 ft. downstream has openings and fissures of several feet. (Pictures of this quarry are attached to the report.)

The raising of the limestone to the dam site by fault action has apparently reversed the dip of the right abutment to the opposite of the balance of the site. Three drill holes reveal the limestone in the right abutment on a northward dip as opposed to the southerly dip of the shales of the left abutment and the floodplain. These drill holes also reveal deep weathering and breakage conditions within the shales that overlie the limestone. The presence of the cavernous limestone in the abutment would allow the possibility of very high leakage from the reservoir and possible piping failure. A strata of sandy chert is located on the face of the right abutment. It is apparently ...ntinuous parallel to the valley in such a manner as to intersect centerline of the dam. This strata is very permeable and would also provide a perbility and piping problem to a structure located in the position of the ...rst centerline studied.

The fault contact, the limestone - shale contact, and the location of the chert strata are marked in red on the plan view of the site. It should be noted that the chert is apparently discontinuous up and down the valley due to the removal of the strata by the action of Illinoian glaciation in the upper portion of the site and by erosion downstream from the site.

A second centerline was located in the field in such a manner as to miss the fault, limestone and the chert strata. This centerline alternate is labeled centerline #2 on the plan view of the geologic investigation. Borings along this centerline indicate less breakage from the faulting and the absence of the limestone strata. The downstream toe of the proposed structure would overlap the chert strata. The foundation for the alternate centerline is located primarily on very weathered shale -- noted in brown in the profiles and cross-sections. This shale is basically a clay shale, but it contains sandy strata that weather into a very permeable soil. Permeability testing in some of these weathered sandy shale strata have indicated high losses. Some rates were in excess of 100 feet per day. A zone encountered in DH-9 was extremely permeable and 30 gallons per minute of water was pumped into a two foot test section for 25 minutes without raising the water level of the test hole to the surface. No external expression of the water loss was seen at the site during pumping or after pumping ceased. The strength of this ...trata should be considered as the blow count of this material dropped to ...e blows per foot in one instance.

rock surface at the proposed emergency spillway area is apparently the highest point in the right abutment. DH-126 indicates that glaciation during the Illinoian advance has removed the weathered rock and deposited glacial till to an increasing depth to the west (see cross-section C-C', sheet 4 of the Plans and Profiles for Geologic Investigation). The till thins to about 3-5 ft. in thickness near the downstream most part of the right abutment. The increase in till thickness and the deep weathering of the shale allow a moderately deep spillway and borrow excavation without encountering rock excavation.

The left abutment of the proposed site presents a good foundation as it is of good strength and is generally impermeable. Ground water enters high in the left abutment and follows along the top of the weathered rock. It is capped and contained by fine grained glacial soils until it reaches the floodplain. At the floodplain intersection with the abutment a line of springs has been developed all along the valley. One of these springs occurring on the centerline has been developed for domestic use. The owner stated that the spring flows year round, but seldom exceeds 2 GPM.

In DH-3, ground water was not encountered above 5 ft. in depth but the water rose to a depth of 1.9 ft. After drilling was completed an artesian flow occurred over the top of the casing extending 0.3 ft. above ground level. Overflow ceased after 8 hours, but water would still return to the p of the casing 10 hours after the completion of drilling. Artesian flow so followed completion of pressure testing. Permanent water impoundment d have access to this strata at several points upstream from the proposed ucture. This may cause some uplift pressure on the structure unless remedial measures are included in the design.

The floodplain of the proposed site is formed by 20 ft. or more of soils overlying gray to black shales of the Hamilton group. The soils consist of 2-4 ft. of alluvium overlying glacial drift. The shales are generally of low to moderate permeability, have a fairly thin weathering depth and are not too badly broken. The exception to the solid shale condition is at DH-5 where the rock is very broken. Permeability testing was carried out in the rock as it is too broken to hold packers. Moderately high leakage was noted in this zone with water intake on some test sections over 10 ft. per day. The lateral zone of breakage is apparently not extensive in this strata as both drill holes 6 and 302 reveal reasonably unbroken, impervious conditions. The valley axis roughly parallels the strike however, and the broken zone is expected to exist in the valley floor for a considerable distance upstream and downstream.

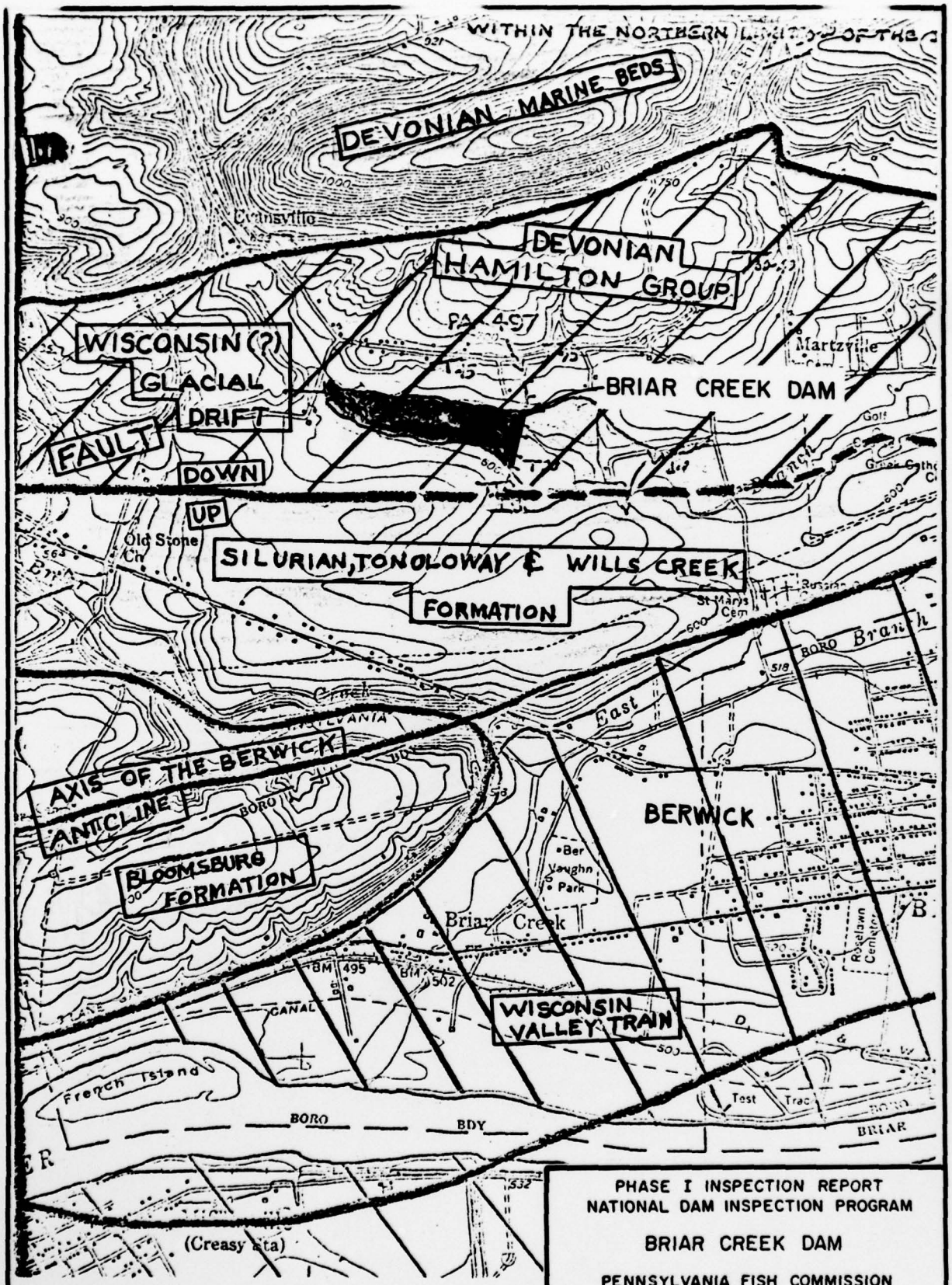
The alluvium capping the floodplain is a soft to medium consistancy silt (ML) with a blow count per foot as low as five. Thickness of this strata varies due to sheet erosion in areas where it has been cropped, natural variance in deposition thickness, and the sale of the strata for topsoil.

derlying the alluvium is a strata of glacial drift that is generally strong with an average blow count of over 100 blows per foot. The Wisconsin (?) drift material can be considered as either one large strata or with the units shown in the plans and profiles for geologic investigation at the discretion of the design engineers. It should be noted that because of the coarseness, heterogeneous nature, and the limited methods of sampling of this material; correlation in the manner shown in the plans and profiles is necessarily arbitrary and the physical limits shown are not necessarily exact. Permeability tests performed in the material give a variety of results from very slow to very rapid dependent on the percentage of fine grained components. Access to this strata is available in many locations within the limits of the proposed impoundment. The water table in this material appears to be related to the creek elevation. This water bearing zone could create possible uplift pressures in the foundation and would allow some leakage through the foundation. Cutoff of the strata would require wet excavation. (See X-Section of these foundation materials showing permeability rates.)

The foundation for the principal spillway will be the same as for the floodplain portion of the dam foundation. Bearing may be restrictive in the alluvium and it may be necessary to place the pipe on the glacial drift. The drift would provide adequate bearing strength for the principal spillway although it would be below ground water level. Consolidation potential for this strata would be low.

row for the proposed embankment may be obtained from the emergency spillway excavation and from the abutment directly upstream from the proposed emergency spillway location. The emergency spillway layout shown in the plans will allow about 60-70% of the necessary borrow to come from the excavation. If desired, further modification can be made to allow all the materials to come from this area. Borrow can be divided into three types, upland soil, Illinoian till, and weathered rock. The glacial till derived (ML-CL) overlying the entire upland area is a good impermeable soil with moderate cohesive strength, low permeability, but with a low to moderate angle of internal friction. Restrictive placement of this material may be required if the strength parameters of the material are low. The underlying soil (CL) formed from Illinoian till is anticipated to have a moderate shear strength and should provide good material for either core or shell. Borrow from the weathered shale will excavate as a SC soil and may breakdown further into a CL by compaction. This material may also require restrictive placement due to a low shear strength. Ultimate use of these materials will depend on the result of the soils testing information.

The following conversion percentages are suggested for the borrow materials in the computation of available fill from bank run yards. Soil layer (ML-CL) is anticipated to have a 10-20% shrinkage due to compaction. The Illinoian till borrow material is anticipated to have a 10% shrinkage due to the amount of material over six inches included in the material. The weathered shale may shrink up to 10% -20% due to compaction.



PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

BRIAR CREEK DAM

PENNSYLVANIA FISH COMMISSION

GEOLOGIC MAP

MAY 1979 PLATE E-1